A REVIEW OF THE PAST AND CURRENT STATE OF THE ALBERTA BEEF PROCESSING INDUSTRY AND IMPLICATIONS FOR THE FUTURE

DAWSON, DAU AND ASSOCIATES LTD.
Economic & Computer Consultants

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February 28, 1984

Mr. Norm Thomson
Chairman, Planning Secretariat
Alberta Agriculture
7000 - 113 Street
Edmonton, Alberta

Dear Mr. Thomson:

We are pleased to submit the report entitled "A Review Of The Past and Current State Of The Alberta Beef Processing Industry and Implications For The Future".

Throughout the study the fact was recognized that the past and future well-being of the Alberta beef industry has been and will continue to based on competitiveness in placing product in out-of-province markets. With the interdependence that exists between the feedlot and processing sectors, both must perform well to maintain or expand Alberta's market position.

Emphasis was placed on factors which affect Alberta's feedlot and processor viability relative to other beef producing areas, namely Ontario and the United States. Information was based on cattle and wholesale price relationships, freight rates, and feed costs through mid 1983. For the review of Alberta-U.S. processor costs a "cost synthesis" model was designed to simulate relative plant costs and to test sensitivity to factors such as kill rates and hours of operation. We appreciate the work of Dr. J. Cothern and Steven and Susan Cothern (Davis, California) in the design of the plant model and accumulation of U.S. data.

In the end, we hope that the documentation and conclusions of this study will provide guidelines for future policy considersations regarding the Alberta beef industry.

Yours truly,

Jim Dawson

Jim Dawson

A MARCH 23RD UPDATE ON DATA FOR THIS REPORT IS FOUND ON THE FOLLOWING PAGE.

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UPDATE
A REVIEW OF THE PAST AND CURRENT
STATE OF THE ALBERTA BEEF PROCESSING INDUSTRY
AND IMPLICATIONS FOR THE FUTURE

Due to ongoing changes in the industry, and the time of study release, the following updates are provided:

1. Plant Capacity Utilization page 98 - 101.

The recent closure of one major slaughter plant and the move back to a single shift for another has reduced estimated slaughter capacity in the Province from 32,450 head to 26,950 head per week. This would signal improved capacity utilization from the situation in 1983, when plants averaged about 83% of capacity. However, slaughter volumes have dropped to about 23,000 head per week in March, 1984, which has resulted in similar rates of capacity utilization to that experienced in 1983. Incidentally, current weekly slaughter volumes are lower than any period experienced in the last 12 years.

2. Slaughter Cattle Marketings, page 74

TABLE B-15 SLAUGHTER CATTLE MARKETINGS BY PROVINCE OF ORIGIN
A, B, AND C GRADES

	B.C.	ALTA.	SASK.	MAN.	ONT.	QUE.
1983	51139	1150482	262189	191546	781852	70887

Page 74, Table 15 showed B.C., Saskatchewan, and Quebec with continued growth from 1978-82 in A, B and C grade marketings. Final information for 1983 indicates that B.C. marketings dropped 13,000 head (minus 20%): Saskatchewan stabilized at 262,189 head, while Quebec increased a further 8,300 head plus 13%).

A

REVIEW OF THE PAST AND CURRENT STATE OF THE ALBERTA BEEF PROCESSING INDUSTRY AND IMPLICATIONS FOR THE FUTURE

PREPARED FOR:

ALBERTA AGRICULTURE

BY:
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Calgary - Vancouver

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EXECUTIVE SUMMARY

Since 1970 Alberta has increased the beef cow herd and inspected slaughter proportionately more than Eastern Canada and the United States. The dependence on out-of-province markets for beef remains a significant determinant of the future viability of the industry. Success for the industry is dependent upon competitiveness in these markets. Several factors appear to affect the Alberta beef industry's position relative to other production and market regions:

From 1971 through 1983 beef cow herds in Eastern Canada decreased by 11.6%, compared to: Canada -4.9%, and the U.S. -.5%. The Alberta herd showed a net increase of 2.3%. Provincial increases occurred primarily in the region including Red Deer and North (+13%), while regions south of Red Deer declined by 9%.

Alberta showed the largest regional increase in feedlot marketings over the 1971-82 period (up 33%), compared to: Canada (24%), and U.S. (-3.2%). Provincial increases were greatest in the region including Red Deer and South (51%), with most notable growth in the Lethbridge area.

From 1971 through 1982, Alberta also showed the largest regional increase in inspected slaughter (30%), compared to: Ontario (7.4%), Canada (18%), and U.S. (7.8%). These increases should not be viewed as permanent, as the high rate of female slaughter in Alberta and Canada inflated 1982 slaughter levels, the West-East share of Canadian inspected slaughter has remained at 60% — 40% respectively, with Alberta accounting for 40-42% of the national total.

Inspected slaughter volumes (federal and provincial) in the Red Deer North region declined from 37.7% to 21.8% of the provincial total from 1973-82, stabilizing at approximately 290,000 head/year during the period 1980-82. Regions south of Red Deer increased from 693,000 head in 1973 to 1,046,000 in 1982 (up 51%), accounting for 78% of Alberta's inspected slaughter in 1982. While shipments of live catle from Alberta generally total around 300,000 head/year, these are largely offset by inward flows from Saskatchewan and B.C.

In 1982, over 75% of the beef processed in Alberta was shipped to out-of-province markets. Quebec accounted for 38%, B.C. 17.6%,

Ontario 8.5%, and other provinces and the U.S. 12.4% of shipments.

Cattle Pricing — Finished cattle pricing in Alberta is unique from that in Toronto or surplus regions in the U.S. With over 75% of Alberta's beef shipped out of the province the weekly Montreal wholesale settlement minus freight and handling becomes the pricing base for all feedlot animals marketed in Alberta. From 1971, and especially since 1979, Alberta's prices for finished cattle have declined relative to Toronto and U.S. levels. The annual price differential between Calgary-Toronto increased from -$1.91 in 1971 to about -$7.50/cwt. (-$2.92/cwt. in 1971 dollars) below Toronto in the first half of 1983. Compared to Omaha choice steers, Alberta A1 steer prices averaged $6.00/cwt. lower from 1982 through June 1983. Part of the decline may be explained by more growth in the Alberta slaughter volume than experienced in Toronto or the U.S., however, most of the price loss can be explained by rising freight rates for beef shipped to Eastern Canada. From January 1970 to January 1983 the rail rate for beef from Calgary to Toronto increased from $2.96/cwt. to $9.02/cwt. ($3.51 in 1971 dollars).

A comparison of annual average prices for 500-600 lb. steers in Calgary and Toronto and 600-700 lb. steers in Kansas City did not show any change in price relationships over the 1971-1983 period. This stable price relationship reflects the fact that feedlots in these regions face similar expectations regarding feedlot returns. Also, most Alberta feeder animals are sold to Alberta feedlots. While Ontario buyers are an important influence in the Alberta feeder cattle market, they generally pay Alberta prices plus freight to Ontario.

Price Margins -- Price margins are defined as the difference between the selling price for finished animals minus the purchase price of feeders (per cwt.). Price margins displayed three distinct stages over the 1971 to June 1983 period in Alberta, Toronto and U.S.:

1971-74 -- Feed grain prices were low and feeding margins were positive. The hold back of heifers for herd expansion and rising feeder cattle prices caused price margins to be neutral and turn negative in the last half of 1973; in the U.S. price margins averaged at a negative level over the entire period.

1975-78 -- Feed grain prices were higher and there was more heifer slaughter as herd reduction began. Lower feeder cattle prices resulted in price margins averaging positive in all regions.

1979-83 -- Feed grain prices declined and there was reduced availability of feeder cattle as a result of herd reductions. High feeder cattle prices caused price margins to average at negative levels in all regions. These large negative price margins may also have been influenced by increased demand for feeder cattle resulting from increased feedlot capacity in the mid-1970's, plus increased utilization of silage which generally ensures that a feedlot operator will feed cattle.

The most notable regional difference in price margins took place during the 1979-83 period as Alberta showed much larger negative margins than other regions. Comparison of the Calgary price margin to that for Alberta feeder cattle (+ freight cost) fed in Ontario showed that, over time, the improvements in the Toronto price margin relative to Alberta has offset rising freight costs for shipment of feeder cattle to Ontario. The price margin in Alberta is not notably different from the margin for Alberta feeder cattle finished in Ontario.

Grain Pricing -- The availability and cost of feed is a major determinant of feeding efficiency and regional advantages in feedlot

production as feed represents 55 to 60 percent of the total cost of finishing cattle. Regional feeding programs in Western Canada are based largely on barley; while Ontario and the Midwestern U.S. utilize corn. Market conditions for feed grains in the U.S. exert a strong influence on the prices for domestic corn and export barley in Canada. Prices on the major U.S. markets for corn (Chicago) and barley (Minneapolis) are highly related to their respective stocks-use ratios (ie. carry-over stocks in relation to domestic requirements) and the supplies of other feed grains. The fact that Canada is generally an importer of U.S. corn and that U.S. barley is a perfect substitute in export markets for Western Canadian barley means that price differences between regions for feed grains are influenced significantly by U.S. conditions.

Price movements in the Alberta non-board barley market have followed similar patterns of adjustment to those of the Ontario and Omaha corn markets. During the 1971-83 period, monthly Alberta barley prices were more closely related to Omaha corn ($r = .912$) than they were to Ontario corn prices ($r = .883$). Alberta barley prices also displayed greater variation then either U.S. or Ontario corn prices (Barley coefficient of variation 35.5% compared to 21.9% for U.S. corn and 30.6% for Ontario corn).

Comparisons using nutritionally adjusted prices (barley equivalent corn prices) revealed that the adjusted corn prices were generally low relative to corn prices during periods of higher grain prices (1974-76 and 1980-83), and high relative to corn prices during periods of lower grain prices (1971-72 and 1977-79). As a result, any Alberta feeding advantage

attributable to grain prices would appear to be marginally larger (smaller) than market prices suggest during periods of lower (higher) grain prices.

Feeding Margins -- Feeding margins are defined as the difference between the revenues and costs attributable to liveweight gain. Comparisons to Ontario and the U.S. indicated that semi-annual steer feeding margins followed similar patterns regardless of the feeding program or method or pricing feed ingredients. Margins for both Alberta feeding programs (barley-hay and barley-silage) were lower than those for Ontario except during the 1972-73 and 1978-79 periods. Over the 11 year period the Alberta margins varied over a wider range (barley-hay from -$8.68 to +$53.82 and barley-silage from -$11.35 to +$53.48). Feeding margins are based on relative feed costs and cattle prices, and while part of the decline relative to Ontario in 1979-83 may be attributed to relative feed costs, the largest impact has been from the decline in finished cattle prices for Alberta as compared to Toronto.

Feedlot Profitability -- Since 1979 the gross margin (price margin + feeding margin) for Alberta feedlots has generally been below that experienced in Ontario. The Ontario advantage is larger for Ontario origin feeder cattle than for feeder cattle shipped from the West. The Ontario advantage for feeding Ontario cattle is based on higher feeding and price margins compared to Alberta, while the Ontario advantage for feeding Western feeder cattle is based largely on relative feeding margins (price margins are similar).

TRANSPORTATION IMPLICATIONS: Transportation and other marketing costs

have been an important determinant of regional comparative advantage in beef feedlot production. In general, the cost of transporting feeder cattle and calves has been less than the cost of transporting feed grains and slaughter cattle when both freight rates and live animal shrink are included. Similarly, carcass or boxed beef has been less expensive to transport than slaughter cattle. As a result, feeder cattle and calves generally move to grain and/or corn silage producing areas (Southern Alberta, Ontario, and Midwest U.S.), and beef moves from these areas to the feed deficit consuming regions (B.C., Quebec, and coastal areas of the U.S.).

Cattle -- The cost of transporting Alberta cattle to markets in Southern Ontario has more than tripled since 1973, and has been mostly absorbed by Ontario buyers. An important observation concerning the cost of Alberta feeder calves to cattlemen in Ontario is that regional feeder cattle price differences do not offset freight charges to Eastern Canada. On an annual basis the price of Alberta feeder calves is generally lower than the Ontario price; but during the peak fall marketing period, when most of the shipments occur, Calgary prices usually increase relative to Toronto. For slaughter cattle, regional price differences have usually more than offset the freight charges to Toronto when shrinkage costs are excluded. However, when the cost of shrink is taken into account, shipments of Alberta slaughter cattle to Eastern Canada are limited to short term periods when large regional price differences exist. Live animal shipments must also compete with generally lower costs for shipping carcass beef to the Toronto and Montreal markets.

Beef -- Clearly the rail rate for beef is a significant factor affecting the Alberta beef industry. This rate, plus Montreal rebate and handling costs, determines Alberta wholesale and cattle prices relative to Ontario and the U.S. From January 1970 the rail rate for beef from Calgary to Toronto has increased from $2.96/cwt. to $9.02/cwt.($3.51 in 1971 dollars) in January 1983 (basis 60,000 lb. cars). After adjustment for the Montreal rebate, the effective cost for the 60,000 lb. car was $11.31/cwt. ($4.40 in 1971 dollars) in January 1983. Calculation of the rebate is based on 75% of the rate difference between 36,000 lb. and 60,000 lb. cars, rather than on actual increases in the cost of handling beef.

Feedgrain -- Over the years the level and method of payment of feedgrain freight rates has been debated. Clearly the feedgrain users objective was to purchase feedgrain based on global prices minus compensatory freight rates. This objective necessitated a "user pay" compensatory rates principle.

The 1983 resolution of the "Crow" issue did not achieve the grain users objective. The legislation is subject to periodic review, and the portion of freight costs payable by grain shippers is subject to formula criteria. Under current rules, the 1983 "Crow Gap" is guaranteed to feedgrain users -- estimated at approximately $6.50/cwt. of gain in Alberta feedlots when domestic feedgrain is priced on an export basis (ie. low Stocks-use ratios). Starting in 1984 and in the future feedgrain shippers will pay a portion of compensatory rates. This will have the effect of increasing freight cost deductions for feedgrain users, at a modified rate, during period of low stocks-use ratios. At the same time, these freight

rate deductions will be less than the levels used by U.S. or Ontario feedlots using corn based rations. Over time Ontario and U.S. feedlots can be expected to increase their advantages in feeding cattle depending largely on what portion of freight costs Western Canadian grain shippers pay.

CATTLE AND WHOLESALE PRICE RELATIONSHIPS: Typically, Canada-U.S. trade in live cattle, results in Canadian cattle prices being derived under the U.S. market which acts to provide a "price ceiling" when Toronto slaughter cattle prices reach a premium over the U.S. sufficient to offset transfer costs for cattle imported from the U.S. The relatively free movement of slaughter cattle between the U.S. and Canada has resulted in a close relationship between cattle prices on the Toronto and U.S. markets, while Alberta prices have decreased reflecting East-West wholesale differentials. Interregional flows of cattle appear to have resulted in arbitrage maintaining Toronto-U.S. cattle market price differences in line with cattle transfer costs, while Alberta cattle prices appear to reflect beef transfer costs to Eastern Canada.

There does not appear to be comparable arbitrage in the wholesale beef markets as beef trade quota is mainly filled with lower quality beef. Wholesale prices in Eastern Canada have increased relative to those of the U.S. by more than the increase in transfer costs. With respect to Western Canada, the Eastern Canadian wholesale price advantage has increased in response to increased West to East meat freight rates and rebate costs. As a result, Alberta wholesale prices have declined relative to Toronto and maintained a stable relationship with U.S. markets. That is, slaughter

cattle prices in Western Canada have declined relative to the Toronto and U.S. markets, while wholesale beef prices in Eastern Canada have increased in relation to both Alberta and the U.S.

Over the 1976-83 (June) period Calgary wholesale beef prices averaged $9.34/cwt. below Montreal and $5.05/cwt. above Omaha values. The Calgary-Montreal price difference was relatively stable at $5.40 to $7.50/cwt. until mid 1978, after which Montreal prices increased relative to those of Alberta as a result of rapidly increasing freight rates on beef shipments to Montreal. The Alberta-Omaha price difference does not appear to have been affected by the trend in freight rates, suggesting that the increase in the Montreal wholesale price offset the effect of increased transportation costs. When the Alberta-Montreal comparison was made after removal of transfer costs (freight and rebate), transportation was revealed to account for a large part of the Montreal advantage; however, the price difference continued to exhibit an increasing trend and greater variability since 1979. Although reasons for increased variation in the Alberta-Montreal price difference are not certain, it does appear that relative supply and demand conditions affect price negotiations. For example, the price difference was not adequate to cover transfer costs during the latter half of 1980 - a period of relatively high prices and tight supplies of beef. Conversely, price differences were greatest during periods of relatively large supplies of beef and lower prices such as during most of 1981 and 1982. The increasing differential between Montreal-Omaha and Montreal-Alberta market prices again supports that Montreal prices have tended to increase relative to other markets since 1979.

Comparisons based on U.S. wholesale prices (adjusted for yield differences) between Calgary A1,2 carcasses and Omaha Choice steers, revealed a close relationship between the two wholesale markets during periods of both positive and negative price differences over the period 1976 to June 1983. Periods of negative price differences (ie. higher U.S. prices on a constant yield basis) indicate an opportunity to export Alberta beef to the United States. After duty and customs clearance, the cost of shipping beef to the Western U.S. from Alberta compares favorably with shipments from the Midwest states.

DEMAND AND CONSUMPTION: Per capita beef consumption in Canada followed an upward trend in post World War II years in response to income growth and favorable price relationships for beef. Although real incomes continued to increase through 1982, the upward consumption trend ceased in 1976. Prices were not adequate to sustain the 1975 production level, and the ensuing industry cut-back in output continued to 1979 with consumption declines persisting to 1980. Since 1980 consumption has stabilized in a range of 88 to 90 pounds per capita. Retail prices have not been sufficient to generate the increase in slaughter cattle prices necessary to induce a positive supply response by the producing sector. At least part of current consumption levels have been maintained through a relatively high level of heifer and cow slaughter. Future beef supplies and, therefore, consumption rates will decline if the beef cow herd stabilizes or shows any increase. It is apparent that beef supplies cannot be expected to increase before 1986 if the herd is to be stabilized, or before 1988 if the herd is increased through lower cow slaughter levels and higher

heifer retention rates.

Since 1971, beef's share of the total meat and poultry consumption has varied with trends in production, levels of real disposable income and relative supplies/prices of pork and poultry products. The relative position of beef compared to pork and poultry has varied since 1971. In general, the increase in real disposable incomes relative to retail prices and comparatively stable consumption rates, indicates that the share of consumers' disposable income spent for meat and poultry products has declined since 1971. During 1971-82 total expenditures on beef, pork and chicken tripled, with beef's share of expenditures decreasing from 56 to 54 percent, while chicken increased from 9 to 12 percent, and pork decreased from 35 to 34 percent. Based on estimated prices, the proportion of consumers' income spent on beef peaked at 3.1% in 1973, reached a low of 2.3% in 1977 and attained a level of 2.8% in 1978 and 1979. A decline in total expenditures during 1982 reduced the share of disposable incomes allocated to beef to 2.28%. With the exception of 1982, pork and poultry followed the same pattern of adjustment as beef (though the magnitude of adjustments for chicken were much lower). High levels of consumption were consistent with periods of relatively large increases in consumer disposable incomes (with the exception of the increases for 1978-79).

Over the 1971-82 time frame a major concern to the cattle industry has been the decline in the proportion of consumer incomes spent on beef, while retail prices and beef consumption rates have remained stable - especially since this expenditure pattern has taken place in an atmosphere of rising incomes and rising prices for substitute products. Various sources have

suggested this situation has been the result of changing consumer preferences in favor of pork and chicken. Such an attitude is only partially supported by statistical evidence, since expenditures on meat and poultry products have not kept pace with growth in disposable incomes. Retail price increases for pork and chicken during the past 3 years may be largely due to the slow to negative growth in real disposable incomes resulting in a shift toward increased purchases of lower priced products.

The demand for meat and poultry products appears to have become less sensitive to income changes, and possibly more responsive to changes in prices and price relationships. This situation suggests that consumers may be approaching a ceiling on the quantity of these products that they are willing to purchase. That is, increased consumption would require either larger increases in incomes or larger decreases in prices than was experienced during the growth period for meat and poultry consumption. Should this be the case, then a relatively large increase in pork supplies during 1983 and continuing into 1984 could have a serious impact on the retail prices for pork, as well as those for beef and chicken.

PROCESSOR VIABILITY: In assessing processor viability, volume-capacity ratios were calculated for the Alberta industry over the 1970-83 period, regional gross margins were estimated for 1976 through 1983, and processing costs in Alberta and the U.S. were simulated for 1983 using an economic-engineering model.

Volume-Capacity Ratio — Alberta processing capacity increased from about 27,000 head per week in the 1960's, to 37,000 by 1974, and is

currently estimated at 32,000 to 33,000 head per week. Slaughter volumes have related closely to the cattle cycle with steer slaughter volumes reflecting cow herd size, and female slaughter reflecting expansion and contraction phases in the breeding herd. Annual slaughter capacity ratios averaged 60 to 65% in the 1970-74 period and increased up to 86% in 1977 when slaughter volumes peaked. Since 1977 slaughter volumes have been lower along with reduced slaughter capacity. Annual utilization rates averaged around 83% since 1980, with monthly rates ranging from 69 to 94 percent.

Gross Margins -- Estimated processor gross margins (excluding by-product values) in Alberta, Ontario and the U.S. have followed almost identical patterns of adjustment over the last decade. Alberta and Ontario gross margins appear to have been very close, while U.S. margins have been lower. Average annual margins tended to decline in 1976 through 1979 and then improve to 1983. While this improvement coincides with annual volume-capacity ratios of 83%, net margins have been affected by changes in plant operating costs and by-product values. By-product values in Alberta are generally priced at Toronto minus freight. Average annual by-product values in Alberta increased from about $31.13 in 1976 to $95.03 in 1979, then decreased to about $64.53 in 1983.

Processing Costs -- Based on the simulation of 90 head per hour plants in Alberta and the U.S. in 1983 total costs per head (excluding land) were $32.21 in Alberta compared to $27.45 in the U.S. Variable costs per head were $26.80 in Alberta and $22.94 in the U.S. Most of the difference was accounted for by labor rates. In the Alberta plant the average labor cost

was $15.11/head accounting for 56% of variable costs and 47% of total cost. In the U.S. the average labor rate was $11.14/head which accounted for 49% of variable costs and 33% of total cost. Fixed costs amounted to $5.41/head in Alberta and $4.51/head (CDN) in the U.S.

Sensitivity to capacity utilization showed that the per head costs increased from $32.21/head when the plant operated at capacity (ie. 90 head/hour) to $35.62 with 80 head/hour, and $40.01 when running at 70 head/hour. If plants were to reduce the hours of operation instead of the rate of plant utilization costs would have increased from $32.21 per head for 1912.5 hours to $33.58 for 1700 hours and $35.35 for 1487.5 hours to process these same volumes.

A significant difference between the Alberta and U.S. situation is in the flexibility in labor negotiations and in capacity utilization. In the past three years the U.S. industry has managed to achieve wage roll-backs and to some extent non-unionization. From the mid-70's to date, notable re-organization has taken place in the U.S. in terms of concentration of plant ownership and emphasis on capacity utilization.

PROSPECTS FOR THE FUTURE: The future structure and viability of the Alberta beef industry will be based largely on the pattern of beef demand, feedlot viability and processor viability. These factors are influenced by variables which are common to Canada and the U.S. such as the state of the economy, but also by factors which have a strong regional influence such as freight rates and trade policy.

Beef Demand -- Per capita beef consumption trended upward throughout the post World War II years reaching a peak of 113 lbs. in 1976, and since then has declined to about 90 lbs. Total meat consumption (carcass weight basis) has averaged 208 to 214 lbs. annually over the past 12 years, and it is quite possible that consumers may have approached an upper limit. If so, future growth will rely on population growth, a decrease in beef prices relative to substitutes, or a decrease in the supply of substitutes. On the other hand, significant growth in consumer incomes can be expected to have a positive influence on prices with resulting growth in production.

Based on a continuation of present consumption rates and past population growth rates, meat requirements will increase by 6.5% by 1988. In addition, moderate economic growth could facilitate a 5% increase in consumption levels (from 90 to 94.5 lbs.) indicating that an 11.8% increase in the total beef supply could be required by 1988.

Feedlot Viability -- Canadian wholesale prices are artificially high relative to the U.S. due to limited quality beef trade with the U.S. This excess is in proportion to increases in the West-East freight rate, plus the Montreal rebate. The deduction of these costs will continue to hold Alberta cattle prices below the U.S. much of the time, while Alberta-U.S. wholesale prices will follow past patterns (generally not feasible for exporting quality beef).

Relative grain and cattle prices can be expected to reduce Alberta's competitive position in feeding margins. With current freight rate legislation for grains and the objective for more export capacity, Alberta

off-quota barley prices should change relative to Ontario or U.S. corn. During periods of strong export demand (low stocks-use ratios), formula freight rates should result in higher off-quota barley prices relative to corn. The situation during periods of surplus feedgrains should reflect those of the past where off-quota barley prices were at a discount relative to corn. Along with feedgrain pricing discrepancies, the Alberta cattle price will continue to decline relative to Toronto reflecting meat freight increases to the East. Between feedgrain pricing and lower relative cattle prices, Alberta feeding margins can be expected to decline relative to Ontario and the U.S.

Processor Viability -- Future viability of the processing sector in Alberta will depend on the availability of slaughter cattle; industry processing capacity; and trends in input costs, particularly labor rates and requirements. Based on assumed industry growth of 12 percent by 1988-89, 1983 processing capacity, and 1983 input costs, processing costs can be expected to increase from about $37.67 (1983) to about $42.94 per head as the average slaughter-capacity ratios decline during the initial two years of the expansionary phase (ie. 14 to 15 percent decrease in slaughter volume from the 1983 level). Average processing costs would then decrease to about $40.01 in the third year (8 percent decrease in slaughter from 1983), before returning to about $37.67 in the fourth year as slaughter levels approach the 1983 level, with the cow herd stabilized at a higher level. The 12 percent increase in slaughter during the fifth year would increase the slaughter-capacity ratio to about 94% percent and reduce average processing costs to about $33.92 per head. Realistically, rationalization of slaughter capacity can be expected. Improvements in

capacity utilization will most likely be achieved through some plant closures and possibly through more intense use of existing facilities as slaughter volumes increase.

In terms of regional advantages, the assumed expansionary phase in the North American beef industry can be expected to have a similar impact on beef processing costs in Alberta and Ontario since the industry structures are similar. In the case of the U.S. industry, the assumed growth pattern would not necessarily result in higher processing costs during the initial years of the expansionary phase. Concentration in the U.S. industry has led to greater flexibility in labor utilization and costs, as well as the ability to adjust industry capacity to more closely reflect volume requirements. That is, the two major U.S. firms (Iowa Beef Processors and Missouri Beef) which account for about 2/3 of U.S. beef slaughter, are able to shift volume among plants to maintain high rates of plant utilization. Labor rates in the U.S. plants, however, can be expected to increase relative to those in Canada as the U.S. economy approaches more normal, or previous low rates of unemployment.

Although Alberta has improved it's position in terms of relative volumes and output since the early 1970's, "erosion factors" have surfaced over the past three years which have contributed to the current state of the industry. Ssome ofthese factors are based on natural geographic differences, while others relate to existing transportation and trade policies. Clearly, a status quo situation on these policies will continue to erode the Alberta beef industry's position in terms of feeding and price margins, as well as processor viability.

PROJECT OVERVIEW

Since the early 1960's, the Alberta beef processing industry has experienced significant growth in its production capacity. Throughout this period, developments in the beef processing sector have been influenced considerably by conditions in Alberta's feedlot industry and trends in beef cow population. Until the late 1970's weekly plant capacity increased steadily. However, since 1977 plant adjustments have resulted in weekly capacity reduction of approximately 7,200 head.

Growth in Alberta's feedlot industry contributed to the growth in processing activity, while the cattle cycle has been the primary cause of the present decline. Since 1977 four of the larger processing plants have shut down corresponding to a 17% reduction in Alberta inspected slaughter. In terms of feedlot slaughter (A, B, and C grades), inspected slaughter fell by 15% over the 1977-82 period. These reductions followed periods of growth estimated at 103% for total Alberta inspected slaughter during 1960-1977 and 57% for feedlot slaughter during 1971-1977.

Further consolidation of plants and rationalization of plant capacity is anticipated by the industry. Signals appear clear that the growth of the early 1960's and 1970's may not be repeated. There is concern regarding the course for future development prospects in the Alberta processing sector. While volume fluctuations generated by the cattle cycle provide an overview of what may be expected in terms of feedlot volume, and in turn, processor volume, other factors are also affecting regional

stability and growth in the beef industry.

The intent of this research project was to outline changing factors which have resulted in the current state of the industry, and to project these factors over the next five years when possible. It is impossible to evaluate the processing sector in isolation, as production volumes at the feedlot level are a major factor which determine processor viability. In short, the viability of the processing and feedlot sectors are highly interrelated. Hence, the report which follows makes every effort to explain and clarify important interrelationships between these sectors as they affect both the current situation and the likely course of future development in the Alberta beef industry.

The report is organized in two parts. Part I, divided into four sections, investigates factors affecting processing plant volumes. The first section provides an overview of the regional distribution of cattle production and marketings within Alberta and outside of the province. The second section relates to aspects affecting regional competitiveness in the feedlot sector including prices, feed costs, and transportation. The third section presents factors affecting regional wholesale prices, while in the last section, processing efficiency is evaluated based on the use of a computerized economic-engineering model.

Part II projects the significant short or long term factors identified in Part I into the future in an attempt to determine the anticipated course of Alberta's beef industry from a regional and North American perspective.

I. PAST AND CURRENT SITUATION 1971-83

A. REGIONAL DISTRIBUTION

1. COW-CALF PRODUCTION

North American beef cow herds underwent a period of expansion starting in 1969 reaching peak numbers in 1975. This expansion phase was the normal five to six year duration and resulted in a 55% increase in the Canadian beef cow herd. The total cattle herd (excluding calves) reached 11.4 million head, up 26% from the previous low in 1968. During this period dairy cow numbers decreased by 18%.

From 1975 through 1979 the Canadian beef cow herd was in a reduction phase brought on primarily by large supplies of beef and other meats and a period of high feedgrain prices. The Canadian beef cow herd increased in 1980 and the U.S. during 1980 and 1981; however, the economic recession and large meat supplies contributed largely to a further herd decline in 1981 through 1983. As a result regional beef cow herds and cattle numbers are currently above those of 1969, and either equal to or below the levels of 1971.

(a) Beef Cow Numbers and Location - Alberta

The 1983 July Cattle Survey indicated that the Alberta beef cow herd was 1,300,000 head, up 2.3% from 1971. During the 1971-83 period there was

some shift in the herd from regions south of Red Deer. Census divisions 1-6, defined as South and South Central accounted for 48.6% of the beef cow herd in 1971 and 43% in 1983 (Table A-1 and Figure A-1). The Central, North, and Peace regions all showed a net increase in the beef cow herd from 1971. The largest increase in cow numbers was in the North region. Census Divisions 11, 12 and 15 each increased by over 20,000 head, while the Peace River Region cow herd increased by 37,000 head.

TABLE A-1 ALBERTA BEEF COWS BY REGIONS 1971-83
(Thousand Head)

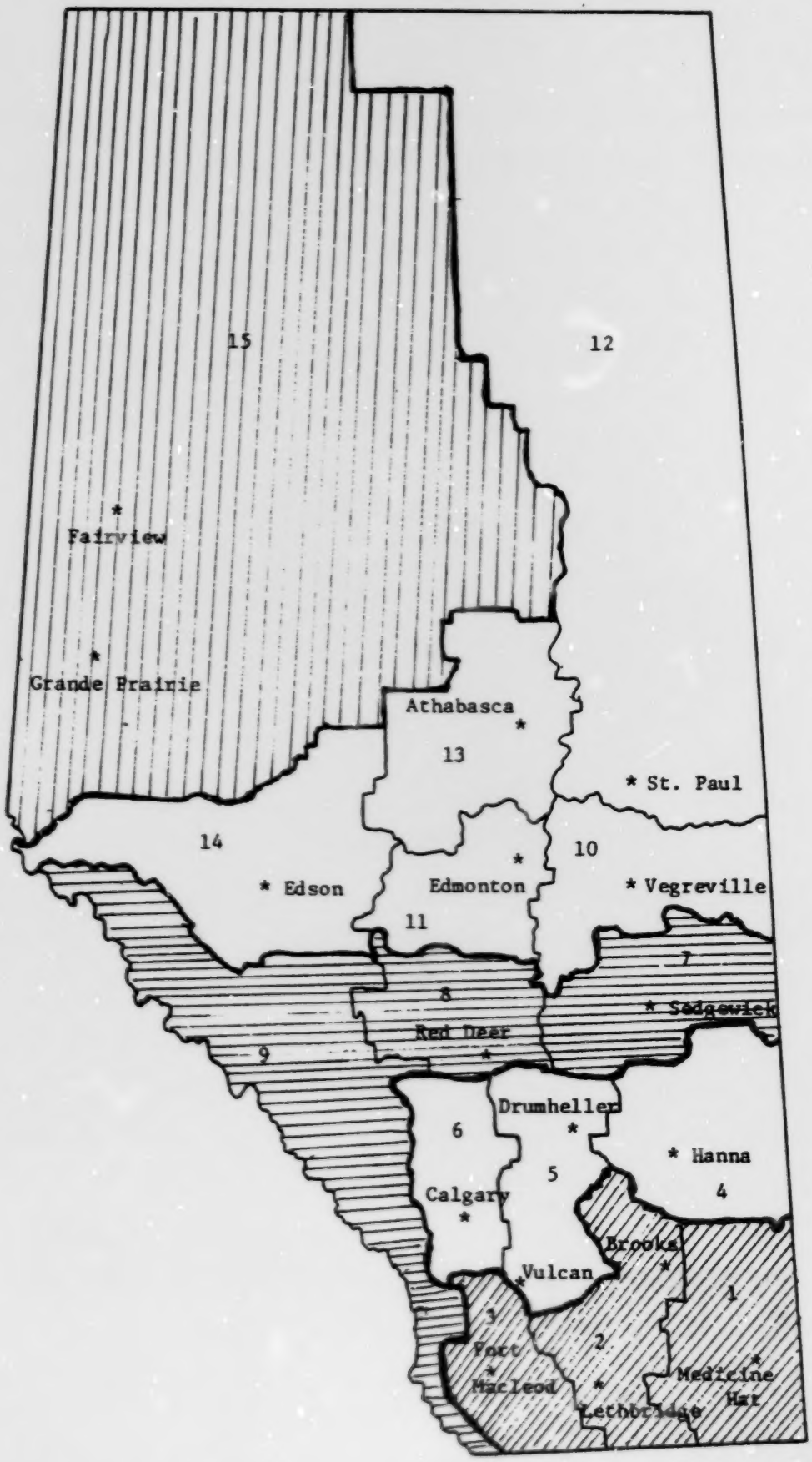
	1971		1976		1981		1983		1983/1971
	No.	%	No.	%	NO.	%	No.	%	
SOUTH C.D. 1,2,3	302.9	23.8	336.0	21.1	281.0	20.5	276.0	21.2	-8.9%
SOUTH CENTRAL C.D. 4,5,6	314.5	24.7	346.2	21.8	305.0	22.3	284.0	21.8	-9.7%
CENTRAL C.D. 7,8,9	252.2	13.6	318.3	20.0	279.0	20.4	268.0	20.6	+ 6.3%
NORTH C.D. 10,11,12, 13,14	352.3	27.7	504.5	31.7	436.0	31.9	408.0	31.4	+15.8%
PEACE C.D. 15	48.3	3.8	85.0	5.3	67.0	4.9	64.0	4.9	+32.5%
TOTAL	1270.2		1590.0		1368.0		1300.0		+ 2.3%

SOURCE: Statistics Canada, "Agriculture Census" and July Survey For 1983.

(b) Beef Cow Numbers - North America

The cattle cycle in Canada and the U.S. follows similar patterns reflecting relatively free North and South trade and common factors

FIGURE A-1 -3-


15
12
Fairview
Grande Prairie
Athabasca
13
St. Paul
14
Edson
Edmonton
10
Vegreville
11
7
8
Sedgewick
Red Deer
9
Drumheller
6
Hanna
5
4
Calgary
Brooks
Vulcan
1
3
2
Fort
Macleod
Medicine
Hat
Lethbridge

affecting the industry in both countries. The North American beef cow herd peaked in 1975 and declined in 1976 through 1979, with further decreases in 1981, 1982 and 1983. By 1975, on a percentage basis, Canada expanded the beef cow herd proportionately more than the U.S., and has reduced the herd proportionately more since then (Table A-2). The net change in the beef cow herd for the 1971-83 period was -6.1% for Canada compared to -0.5% for the U.S.

TABLE A-2 REGIONAL BEEF COW HERDS 1971 - 83
(Thousand Head)

	1971	1975	1982	1983	Net Changes 1971-1983
Alberta	1270.2	1692	1350.0	1300.0	+ 2.3%
West	2866.4	3747	2840.0	2727.0	- 4.9%
East	647.9	853	573.1	575.0	-11.3%
Canada	3514.3	4600	3401.1	3302.0	- 6.1%
U.S.A	38689.0	46900	38970.0	38520.0	- 0.5%

SOURCE: Statistics Canada, July Cattle Surveys and
USDA Livestock and Meat Situation and Outlook.

Within Canada, the herd increase from 1971 to 1975 was about 30% in the West and East, and 33% in Alberta. With the herd reduction since then, the net change in cow herds from 1971 to 1983 was +2.3% in Alberta, -4.9% for the West and -11.3% for the East. The result of these changes in herd size has been an increase in the Alberta and Western Canadian share of the Canadian cow herd — Alberta from 36.1% in 1971 to 39.4% in 1983, and the West from 81.6% to 82.6% (Table A-3).

The Canadian herd declined relative to the U.S. from 9.1% in 1971 to 8.6% in 1983.

TABLE A-3 PERCENT SHARE OF CANADIAN AND U.S. HERD 1971-83

	1971	1975	1981	1982	1983
Alberta	36.1	36.8	38.9	39.7	39.4
West	81.6	81.5	83.5	83.1	82.6
East	18.4	18.5	16.5	16.9	17.4
Alta/U.S.	3.3	3.0	3.4	3.5	3.4
Can./U.S.	9.1	9.8	8.8	8.8	8.6

2. FEEDLOT PRODUCTION

(a) Feedlot Production and Location - Alberta

Alberta feedlot production (estimated by using Grade A, B, and C marketings) increased from 1971 through 1977 reflecting the larger calf crops from growth in the breeding herd through 1975, plus more heifer slaughter in 1976 and 1977 as herd reduction commenced. From 1971 through 1977 A, B, and C marketings increased from 848,000 to 1,332,000 (+57%). In 1982 the volume was 1,130,000 head, down 15% from 1977, and up 33% from 1971.

During the 1971-82 period there was some shift in A, B, and C marketings from regions north of Red Deer to the Southern regions (Table A-4). The largest percentage increase was in the Southern region (C.D. 1,2,3) from 35.8% to 43.6% of the provincial total. The combined marketings for the South and South Central regions increased from 60% in 1971 to 69% in 1982. The Central regions' share was up slightly at 20.6%,

while the Northern region decreased from 20% to 10% of the provincial total.

While the production volume in all regions was down from the 1977 peak, comparison to 1971 clearly shows the orientation to cattle finishing in the Southern regions.

TABLE A-4 ALBERTA A,B,& C GRADE MARKETINGS BY REGIONS 1971-82
(Thousand Head)

	1971		1977		1981		1982		% CHANGE 82/71
	No.	%	No.	%	No.	%	No.	%	
SOUTH									
C.D. 1,2,3	303.5	35.8	580.9	43.6	525.8	46.4	492.5	43.6	+62.3
SOUTH CENTRAL									
C.D. 4,5,6	206.3	24.3	281.8	21.1	264.3	23.3	288.6	25.5	+40.0
CENTRAL									
C.D. 7,8,9	160.0	18.9	253.4	19.0	220.3	19.5	232.4	20.6	+45.2
NORTH									
C.D. 10,11,12 13,14	169.5	20.0	200.5	15.0	117.1	10.3	112.0	9.9	-34.0
PEACE									
C.D. 15	8.3	1.0	15.4	1.1	4.6	.4	4.5	.4	-52.0
TOTAL	847.7		1332.0		1132.0		1130.0		+33.3

SOURCE: Agriculture Canada Annual Livestock Market Reviews.

(b) Feedlot Production and Location - North America

The volume of feedlot production is determined by the size of the calf crop the previous year; the stage in the cattle cycle which determines the rate of heifer retention; and by feed prices which may shorten or lengthen

feeding periods, or may divert cattle away from feedlot finishing. In the U.S. estimates indicate about 10% of steer and heifer slaughter is non-fed. Such information is not available for Canada; however, the portion of non-fed steers and heifers in Canada can be assumed much lower due to grading requirements and a shorter grazing season than in many regions of the U.S.

The volumes in Canada and the U.S. peaked in 1977 and then declined through 1980. Estimated fed cattle marketings increased moderately in 1981 and 1982 largely reflecting increased heifer slaughter (Table A-5).

TABLE A-5 REGIONAL A,B, & C GRADE MARKETINGS 1971-82*
(Thousand Head)

	1971	1977	1981	1982	Net Change 1971-1982
Alberta	847.7	1332.0	1132.0	1130.1	+33.3%
West	1361.5	1962.0	1576.1	1654.8	+21.5%
Ontario	654.3	918.1	792.6	793.8	+21.3%
East	688.7	966.9	873.6	892.2	+29.5%
Canada	2050.2	2928.9	2449.7	2547.0	+24.2%
U.S.A.					
- Fed	26060	25890	23818	24688	- 5.3%
- Non-Fed	2517	5199	3717	2968	+17.3%
TOTAL	28577	31089	27535	27656	- 3.2%

* Canadian figures represent A,B, & C grade steer and heifer marketings including non-fed.

U.S. figures represent commercial slaughter of fed and non-fed steers and heifers.

SOURCE: Agriculture Canada Annual Livestock Market Reviews and USDA Livestock and Meat Situation and Outlook.

The table shows a 24.2% increase in Canadian A, B, & C grade marketings

from 1971 through 1982 (+33% for Alberta, +24% for Canada), but a 3.2% decline in the U.S. While these percentages do reflect the change in relative beef supplies, they must be interpreted with caution. The sex of slaughter is a major determinant of relative annual marketings, and in Canada heifer marketings are much more volatile than in the U.S. For example, much of the relative Canada/U.S. increase in the 1971 to 1972 comparison may be explained by heifer marketings. In 1971 heifers accounted for 26.2% of U.S. marketings and 29% in 1982; while Alberta heifer marketings increased from 25.7% in 1981 to 35.9% in 1982. Regional differences in herd growth over the period were not large enough to account for the differences in relative market volumes.

Table A-6 outlines regional market shares for fed cattle marketings over the 1971-82 period. In 1982 Alberta accounted for 44.4% of Canadian A,B, & C grade marketings, the West 65%, Ontario 31.2%, and the East 35%. Alberta and Canadian marketings as a percentage of the U.S. increased through the period reflecting a larger breeding herd increase in Canada, and in more recent years a higher rate of heifer marketings.

TABLE A-6 PERCENT SHARE OF CANADIAN AND U.S. MARKETINGS 1971-82

	1971	1977	1981	1982
Alberta	41.3	45.5	46.2	44.4
West	66.4	67.0	64.3	65.0
Ontario	31.9	31.3	32.3	31.2
East	33.6	33.0	35.7	35.0
Alta/U.S. Fed	3.2	5.1	4.7	4.6
Can./U.S. Fed	7.9	11.3	10.3	10.3
Alta/U.S. Total	3.0	4.3	4.1	4.1
Can./U.S. Total	7.2	9.4	8.9	9.2

3. REGIONAL SLAUGHTER

(a) Regional Inspected Slaughter - Alberta

With exception of on-farm cattle slaughter, virtually all cattle slaughtered in Alberta are inspected by either Federal or Provincial health inspectors. The Annual Livestock Market Reports for the Calgary and Edmonton public stockyards provide a summary of federally and provincially inspected slaughter regions. The Northern Regions (Red Deer and North) have accounted for a declining share of Alberta's inspected slaughter, from 37.7% in 1973 to 21.8% in 1982 (Table A-7). Plant volumes at Red Deer and North were 291,000 in 1982 compared to 1,046,000 head in the region south of Red Deer. Slaughter volumes in the Red Deer - North region appear to have stabilized around 290,000 head per year in the 1980-82 period.

TABLE A-7 ALBERTA FEDERAL & PROVINCIAL INSPECTED CATTLE SLAUGHTER
1973 - 1982

	NORTHERN REGION 1)		SOUTHERN REGION 2)		ALBERTA *
	NO. HEAD	%	NO. HEAD	%	TOTAL
1973	419168	37.7	693133	62.3	1112301
1974	390010	34.5	740921	65.5	1130931
1975	469296	34.6	890002	65.4	1359298
1976	523198	33.9	1021887	66.1	1545085
1977	512842	32.0	1092919	68.0	1605761
1978	402396	29.0	987980	71.0	1390376
1979	349280	27.5	919464	72.5	1268744
1980	298614	23.6	964198	76.4	1262812
1981	288089	22.1	1014747	77.9	1302836
1982	291992	21.8	1046034	78.2	1338026

1) Red Deer and North; 2) South of Red Deer
* Alberta total does not equal inspected slaughter volumes.
SOURCE: Annual Reports of Edmonton and Calgary Yards.

(b) Regional Inspected Slaughter - North America

Federally inspected slaughter peaked during 1977 in Canada and during 1976 in the U.S.. Volumes decreased through 1980 in all regions (Table A-8) and recovered in 1981 and 1982.

In Canada the West-East shares of inspected slaughter were stable through the 1971-82 period with the West generally accounting for 60% and the East 40%. Exceptions were 1976 and 1977 when cow slaughter was at record levels and the Western share of national slaughter increased to 63%. Alberta's share of Canadian inspected slaughter increased from the 31-33% range in the late 1960's to 40% by 1975. Since then Alberta's share has been 40-42% and Ontario generally 30-32%. Canadian slaughter equalled 8.9% of the U.S. volume in 1971 and 9.7% in 1982.

TABLE A-8 REGIONAL INSPECTED SLAUGHTER
(Thousand Head)

	1971	1977	1980	1981	1982
Alberta	1015.9	1590.1	1251.2	1294.8	1320.6
West	1636.3	2364.7	1801.1	1865.4	1974.4
Ontario	915.1	1070.7	993.6	1031.4	983.5
East	1150.6	1396.7	1258.3	1331.4	1319.6
Canada	2786.9	3761.4	3059.5	3196.9	3293.9
U.S.	31419.0	38718.0	31643.0	32819.0	33873.0

Over the 1971-82 period annual slaughter volumes showed significant cyclical change. Alberta's volume increased by 574,000 head (+56%) from 1971 to 1977. The 1982 volume was down 270,000 head (-17%) from 1977

resulting in a net change of +304,000 head (+30%) for the 1971-82 period. In other regions the 1971-77 increase in slaughter volumes were not as significant, nor were the volume declines for the 1977-82 period. Net change for the 1971-82 period in Ontario was +7.4%, Canada +18.2%, and the U.S. +7.8%.

PERCENT VOLUME CHANGE 1971, 1977, 1982

	1971 to 77	1971 to 82	1977 to 82
Alberta	+56.5	+30.0	-17.0
West	+44.5	+20.7	-16.5
Ontario	+17.0	+ 7.4	- 8.2
East	+21.4	+14.7	- 5.5
Canada	+34.9	+18.2	-12.4
U.S.	+23.2	+ 7.8	-12.5

(c) Sex of Slaughter

While larger calf crops resulting from breeding herd growth provide partial explanation for increased slaughter levels, most of the fluctuation can be accounted for by changes in the sex of slaughter mix. The number and percentage of cows and heifers marketed varies considerably between expansion and contraction phases in the cow herd.

While steer slaughter increased through the mid-70's reflecting breeding herd growth that peaked in 1975, the rate of female slaughter contributed significantly toward large slaughter volumes (Table A-9). During the herd expansion phase cows and heifers accounted for up to 43% of the total Alberta slaughter volume, and reached 50% in 1975 through 1977 as the herd was being reduced. The lowest level of female slaughter since the

mid-70's was in 1979 (44.9% of total slaughter) which resulted in a small herd increase in 1979 and 1980. In 1982 the steer volume was comparable to that in 1972 reflecting similar sized cow herds in 1971 and 1981. However, 1982 female slaughter was considerably higher than in 1972 (51.1% of total) indicating that the breeding herd was under-going further reduction. The July 1983 Cattle Survey indicated Alberta's beef cow herd down 3.8% from 1982.

TABLE A-9 ALBERTA SEX OF INSPECTED SLAUGHTER

	STEERS	HEIFERS	COWS	BULLS	TOTAL
1972	640.9	285.7	171.4	14.3	1112.3
1973	671.4	243.2	182.9	14.6	1112.3
1974	621.4	286.9	195.6	27.5	1131.5
1975	648.2	409.6	274.5	19.8	1352.1
1976	745.8	501.3	276.5	13.9	1537.6
1977	781.5	547.8	248.9	11.9	1590.2
1978	691.3	477.2	202.1	10.7	1381.3
1979	684.7	403.3	160.6	8.0	1256.6
1980	635.9	430.6	173.9	10.7	1251.2
1981	643.2	457.1	183.5	10.9	1294.8
1982	637.6	474.1	200.5	8.3	1320.6

PERCENT OF TOTAL

	STEERS	HEIFERS	COWS	BULLS	% FEMALE
1972	57.6	25.7	15.4	1.3	41.1
1973	60.4	21.9	16.4	1.3	39.4
1974	54.9	25.4	17.3	2.4	42.7
1975	47.9	30.3	20.3	1.5	50.6
1976	48.5	32.6	17.9	.9	50.5
1977	49.1	34.4	15.6	.7	50.0
1978	50.0	34.5	14.6	.8	49.1
1979	54.5	32.1	12.8	.6	44.9
1980	50.8	34.4	13.9	.8	48.3
1981	49.7	35.3	14.2	.8	49.5
1982	48.3	35.9	15.2	.6	51.1

* Cow volumes do not include live exports to the U.S.

4. ALBERTA LIVE CATTLE AND PRODUCT FLOWS

(a) Live Cattle

Outward Flows - Alberta brand inspection records provide an overview of out-of-province cattle and calf shipments (Appendix 1). From 1971 to 1978 shipments from Alberta increased from 105,000 head to 336,000 head with 1982 at 331,000 head. In most years 50 to 65% of Alberta's shipments have gone to Ontario with most of the remainder going to Saskatchewan and the U.S. Alberta brand inspection statistics do not separate slaughter cattle from breeding stock or feeder cattle; however, Agriculture Canada West to East statistics indicate that approximately 90% of Alberta shipments to the East are feeder cattle (Appendix 2).

Since the breeding herd reduction started in the mid-70's approximately 2/3 of exports to the United States have been slaughter cattle, mainly cows. There have been periodic shipments of finished cattle in recent years based on Alberta - U.S. price differentials. Information is reported by border crossing points and therefore does not provide a reliable indicator of provincial exports.

Inward flows - The outward shipment of Alberta slaughter and feeder cattle is generally offset by inward flows from Saskatchewan and British Columbia. Saskatchewan shipments to Alberta ranged from 197,100 to 246,800 head per year from 1979 through 1982 (Table A-10). Information for B.C. shipments is not available; however, based on the size of the B.C. cow herd and the number of feeders which are finished in B.C. or shipped to Eastern

Canada, feeder cattle shipments to Alberta have been estimated up to 100,000 head per year.

TABLE A-10 SASKATCHEWAN CATTLE SHIPMENTS TO ALBERTA

	1979	1980	1981	1982
Feeder Cattle	206,331	221,787	189,800	168,930
Slaughter Cattle	26,277	25,078	20,680	28,250

SOURCE: Saskatchewan Agriculture, Saskatchewan Cattle Marketing Report.

(b) Beef

A study done by Dawson, Dau and Associates outlined the distribution of beef processed in Alberta for 1982 (Table A-11). Approximately 75% of the beef processed in Alberta is shipped out-of-province: Quebec 38%, B.C. 17.6%, Ontario 8.4%, and other provinces and the U.S. 12.4%.

TABLE A-11 REGIONAL DISTRIBUTION OF ALBERTA BEEF 1982

-Carcass Weight Equivalent-
(Thousand Pounds)

	Alberta	B.C.	Quebec	Ontario	U.S. & Other Prov.	Total
A,B,C Carcass	32217	67226	195613	37686	14432	352174
Boxed	128647	75007	64013	24582	65079	357328
Cow Carcass	-	-	50600	2170	18220	70990
Boned Cow	25665	1887	700	2525	3317	34094
Bull Carcass	1038	47	757	1700	248	3790
TOTAL	192567	144167	311683	68663	101296 *	818376
% of Total	23.5%	17.6%	38.1%	8.4%	12.4%	

* Approximately 20% of U.S. & Other Province total was shipped to the U.S.

B. REGIONAL FEEDLOT RELATIONSHIPS

1. FEEDER AND FINISHED CATTLE PRICES

(a) Finished Cattle Prices

Price differentials in the beef industry may be affected by short and long term regional variations in supply and consumer demand, marketing and production costs, changes in freight rates, and by unforeseen influences such as strikes or trade disagreements. Longer term factors such as the cyclical nature of the beef supply and consumer demand are generally common to Canada and the U.S. and do not provide significant explanation for changing price relationships.

Finished cattle pricing in Alberta is unique from that in Toronto or surplus regions in the U.S. Over 75% of Alberta's beef is shipped out of the province with 38% to Quebec and about 8.5% to Ontario. The weekly Montreal wholesale settlement minus freight, freight rebate, and handling becomes the pricing base for all feedlot animals marketed in Alberta. In turn, the supply of slaughter cattle in Ontario plays an important role. Ontario's beef supply revolves around self-sufficiency with relative wholesale prices determining beef flows to Montreal as well as inward flows (slaughter cattle and beef) from the U.S. The market arbitrage between Toronto, Montreal and the U.S. becomes the over-riding factor in determining Toronto and Alberta cattle prices. In the U.S. several states are deficit in beef, relying on other states for grain-fed beef. The

market in the U.S. is much larger than the Canadian market and selling options for surplus states are more numerous than those experienced by Alberta processors.

The prices of A1 steers at Calgary and Toronto and choice steers at Omaha were compared for 1971 through 1982 to identify possible changes in regional price relationships for finished cattle (Table B-1). Over the twelve year period Alberta prices have clearly declined relative to Toronto and Omaha (Figure B-1).

TABLE B-1 REGIONAL FINISHED CATTLE*
PRICE DIFFERENTIALS, 1971-83
- Canadian $/cwt.-

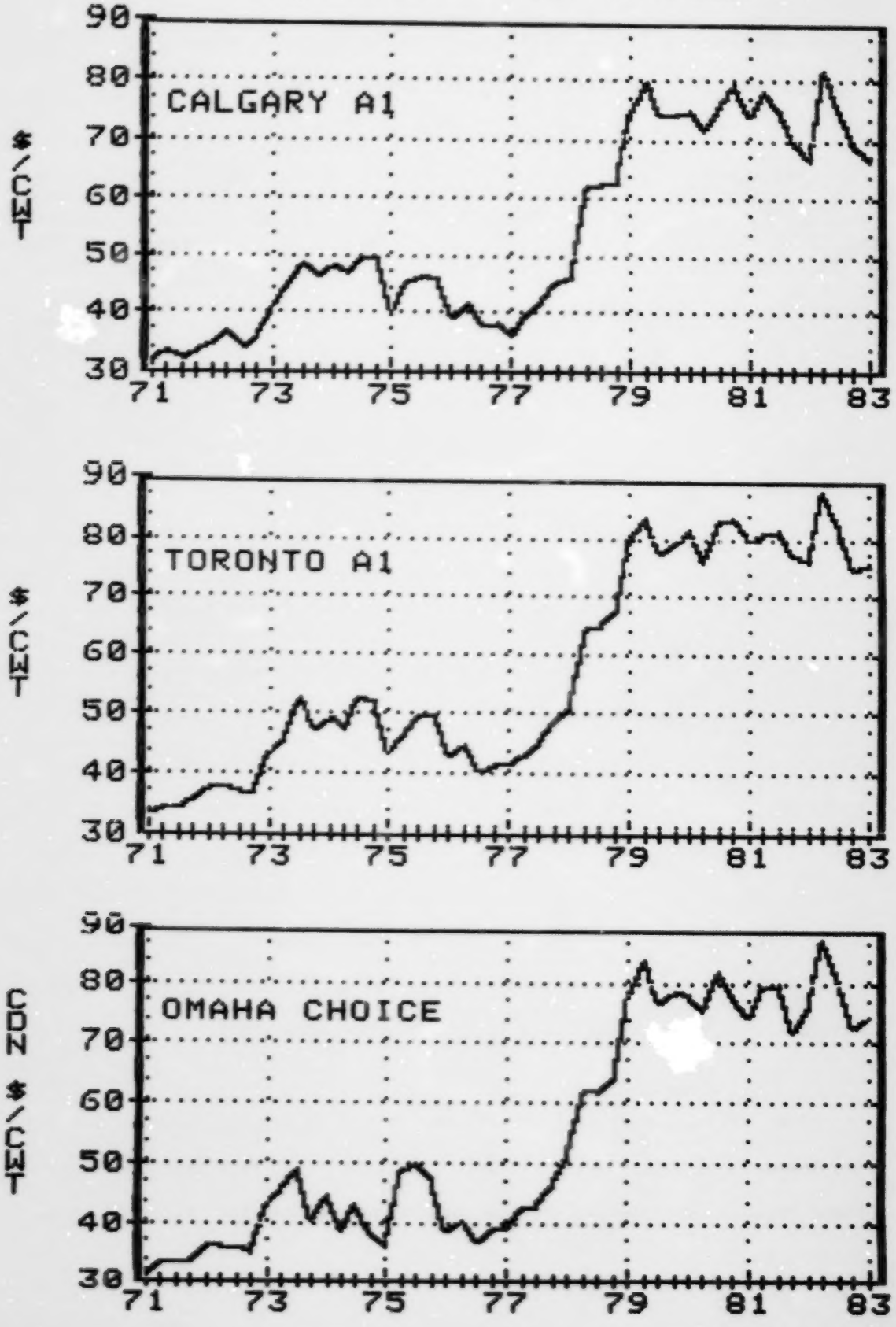
	CALGARY-TORONTO	CALGARY-OMAHA	TORONTO-OMAHA
1971	-1.91	- .35	1.56
1972	-2.02	- .34	1.68
1973	-2.38	.42	2.80
1974	-1.82	7.20	9.03
1975	-3.30	-1.50	1.80
1976	-3.22	.38	3.60
1977	-4.03	-2.36	1.66
1978	-3.44	-1.37	2.07
1979	-4.01	-3.28	.73
1980	-5.42	-2.64	2.77
1981	-5.81	-2.29	3.52
1982	-7.02	-6.17	.84
Jan-June/83	-7.58	-6.67	.90

* Calgary and Toronto A1 Steers over 1000 lbs. and Omaha Steers 900 - 1100 lbs.

From 1971 the Calgary - Toronto annual average price differential increased from -$1.91/cwt., to the -$3.00 to -$4.00 range in the mid-1970's, and in the first half of 1983 was averaging around -$7.50/cwt. (-$2.95/cwt. in 1971 dollars). In 1978 through 1979 the Alberta A1 steer

FIGURE B-1

SLAUGHTER STEER PRICES



price averaged $1.37 to $3.28/cwt. below Omaha choice steers, and in 1982 through June 1983 the Alberta price averaged over $6.00/cwt. lower.

While part of the 1982-83 decline in Alberta's price relativity may be explained by more growth in the Alberta slaughter volume than experienced in Toronto or the U.S., there has been an obvious downward trend in Alberta's price relativity through the 1971-83 period. This trend can partly be explained by rising freight rates for beef shipped to Eastern Canada and the impact these rates have on slaughter cattle prices in Alberta. From January 1970 the rail rate for beef from Calgary to Toronto increased from $2.96/cwt. to $9.02/cwt. in January 1983.

(b) Feeder Cattle Prices

Comparison of annual average prices for 500-600 lb. steers in Calgary and Toronto and 600-700 lb. steers at Kansas City did not show a notable change in price relationships over the 1971-83 period. Based on annual averages, Calgary feeder steer prices were generally $1.00 to $3.00/cwt. below Toronto, with the exception of the 1978-1980 period when Western feeder prices were at record levels (Table B-2). There is a tendency for Alberta prices to exceed Toronto in the last quarter of the year. The relationship of Calgary and Toronto feeder steer prices to Kansas City was sporadic with no apparent trend in price differentials developing.

The relatively stable price relationship of Calgary feeder steers to the Toronto and Kansas City markets reflects the fact that feedlots in these regions face similar expectations regarding feedlot returns. Also,

most Alberta feeder animals are sold to Alberta feedlots. While Ontario buyers are an important influence in the Alberta feeder cattle market, they pay Alberta plus freight to Ontario.

TABLE B-2 FEEDER CATTLE PRICE DIFFERENTIALS,* 1971-83
- Canadian $/cwt.-

	CALGARY-TORONTO	CALGARY-KANSAS CITY	TORONTO-KANSAS CITY
1971	- .35	-1.42	-1.07
1972	-2.09	-3.15	-1.06
1973	-1.76	1.17	2.93
1974	-3.69	6.67	10.36
1975	-2.26	.32	2.58
1976	-3.17	- .74	2.43
1977	-2.23	-1.13	1.09
1978	4.28	4.76	.48
1979	10.97	13.79	2.82
1980	5.04	3.29	-1.75
1981	- .04	- .38	- .34
1982	-1.02	-1.92	- .90
Jan-Jun/83	-1.63	-10.02	-8.40

* Calgary and Toronto 500-600 lb. steers and Kansas City 600-700 lb. Medium No.1 Steers.

(c) Cattle Price Margins

Returns in the feedlot sector are a function of price margins and feeding margins. Price margins on a hundredweight basis are defined as the difference between the selling price for finished animals minus the purchase price of feeders, or on an animal basis (Al price-Feeder price) x Weight of the feeder animal. Feeding margins on a hundredweight basis are defined as the difference between the selling price for finished animals minus the feed cost per hundredweight of gain, or on an animal basis (Al price-Feed Cost/cwt.gain) x Weight gain.

Over time price margins and feeding margins generally show opposite signs. In other words, if the returns on weight gain (feeding margins) are positive, feeder cattle prices will usually increase to the point that price margins are negative; or the opposite situation where returns on weight gain are negative pressuring feeder prices down to the point that price margins are positive. The balance of these two margins determines the net returns over feed and feeder costs.

Price margins were calculated for 1971 through June 1983 using a six month lag for feeding periods (Table B-3). Over this period there were three distinct stages for price margins in Alberta, Toronto and the U.S.:

a) 1971-74 - Low feed grain prices, positive feeding margins, hold back of heifers for herd expansion, rising feeder cattle prices — price margins running neutral and turning negative in the last half of 1973 through 1974; the U.S. averaged negative in 1971-74.

b) 1975-1978 - Higher feedgrain prices, more heifer slaughter as herd reduction starts, lower feeder cattle prices — price margins average positive in all regions, and

c) 1979-83 - Feedgrain prices come down, availability of feeder cattle lower reflecting past herd reduction, high feeder cattle prices — price margins average negative in all regions. These large negative price margins may also have been influenced by increased demand for feeder cattle resulting from increased feedlot capacity in the mid-1970's, plus increased utilization of silage which generally ensures that a feedlot operator will feed cattle.

The most notable regional difference in price margins took place in

the 1979-83 period with Alberta experiencing much larger negative margins than other regions (Figure B-2). These larger negative margins were caused by a continued decline in Alberta A1 prices relative to Toronto, from -$4.03/cwt. in 1979 to -$7.58 in the first half of 1983; and by Calgary feeder prices averaging higher than Toronto in 1978 through 1980.

TABLE B-3 REGIONAL CATTLE PRICE MARGINS,* 1971-83
-Per cwt. of Feeder Animal-

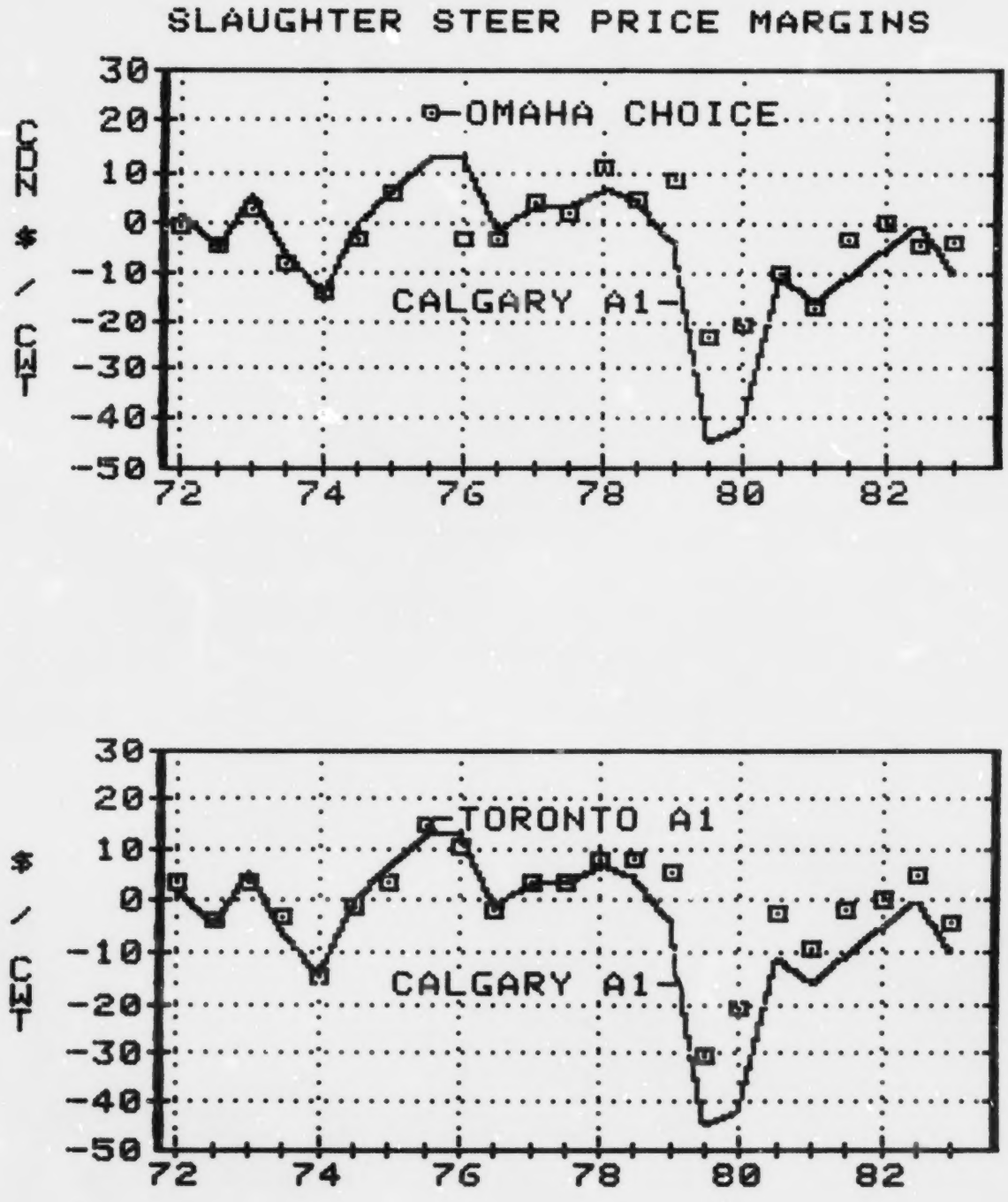
	CALGARY	TORONTO #1	TORONTO #2	U.S.
1971	-1.17	1.30	-1.24	-1.04
1972	- .81	.34	-1.34	-1.76
1973	.99	- .19	.69	-3.29
1974	-5.97	-6.62	-6.74	-7.05
1975	6.91	8.99	7.47	13.05
1976	2.14	1.40	1.15	- .06
1977	2.78	3.63	2.28	2.04
1978	6.32	9.95	5.22	5.40
1979	-23.70	-10.22	-24.37	-6.50
1980	-23.35	-10.55	-22.82	-11.89
1981	-12.70	- 3.60	-12.24	- 7.97
1982	- 2.31	3.56	- 1.54	- .10
Jan-Jun/83	-7.20	- .14	- 6.50	.23

* All margins are based on a six month feeding period

Calgary = Clg. A1 - Clg. 500 - 600 lb. st.
Toronto #1 = Tor. A1 - Tor. " " " " "
Toronto #2 = Tor. A1 - Clg. " " " " " (inc. freight)
U.S. = Omaha ch. - Kansas City 600 - 700 lb.st.

Calgary vs Toronto - Comparison of price margins for Alberta feeder cattle purchased and finished in Alberta to Ontario feeder cattle purchased and finished in Ontario (Table B-3) shows that the Ontario margins were generally larger (more positive), with negative margins much smaller (less negative). During 1979-83, Toronto annual average price margins were $7 to $12/cwt. less negative than in Alberta.

FIGURE B-2


SLAUGHTER STEER PRICE MARGINS
OMAHA CHOICE
CALGARY A1
TORONTO A1
CALGARY A1
¢ / LB
30
20
10
0
-10
-20
-30
-40
-50
72
74
76
78
80
82

A comparison of the Calgary price margin to that for Alberta feeders (+freight cost) fed in Ontario showed that over time the improvement in the Toronto price margin relative to Alberta has offset rising freight costs for shipment of feeder cattle to Ontario. Double deck rates have increased from $1288/car in the fall of 1970 to $3925/car in the fall of 1982, or based on 54,000 lbs. per car from $2.38/cwt. to $7.27/cwt. The price margin in Alberta is not notably different from the margin for Alberta feeder cattle finished in Ontario.

2. FEED SUPPLIES AND PRICES

The availability and cost of feed is a major determinant of feeding efficiency and regional advantages in feedlot production. Feed costs represent about 55 to 60 percent of the total cost of finishing cattle, and tend to vary regionally with the nature of feeding programs (type and weight of cattle, weight gain, feeds, and feeding periods) and feed prices. Regionally, feeding programs are based primarily on barley in Western Canada while corn/corn silage combinations are prevalent in Ontario and Midwest U.S.. Varying amounts of other grains, silages, harvested forages, and protein supplements are utilized. Feed grains contain the most concentrated form of energy available for feeding cattle, and have provided the most efficient means of finishing animals for at least the heavier weights (over 900 lbs) [Brokken et al, 1980]. With the exception of the protein-rich feeds (eg. soybean and rapeseed meals), other feed sources such as silages and forages are usually priced according to their respective feeding values in relation to the available feed grain supply, or in some cases according to either opportunity or production costs.

(a) Feed Grain Prices

Feed grain prices in Canada have fluctuated widely in response to changing world supply and demand conditions. Increased world production resulted in an inventory build-up and depressed markets for feed grains during 1969-72. A major crop failure in Russia during 1972 followed by successive years of below normal production maintained prices at relatively high levels through 1975. Prices generally declined to the third quarter of 1977, increased to record highs during the first half of 1981. After 1981 lower prices were experienced as inventories became larger. A severe drought in the U.S. during 1983 reduced U.S. corn production to about half the 1982 level. As a result 83-84 corn supplies will be about 1/3 less than in the 82-83 crop year. The projected decline in stocks should have a significant impact on world feed grain prices. The United States accounts for approximately 50 percent of the world coarse grain exports and U.S. corn represents about 25 percent of the total world feed grain production.

Market conditions for feed grains (particularly corn) in the U.S., exhibit a strong influence on the prices for domestic corn and barley prices in Canada. Prices on the major U.S. markets for corn (Chicago) and barley (Minneapolis) are highly related to their respective stocks-use ratios (ie. carry-over stocks in relation to domestic requirements) [Malmberg, 1980] and the supplies of other feed grains. Canada is generally an importer of U.S. corn, and prices for Ontario corn therefore reflect the U.S. price plus transfer costs (transportation, tariffs and exchange rates). The price level for Eastern Canadian corn is also

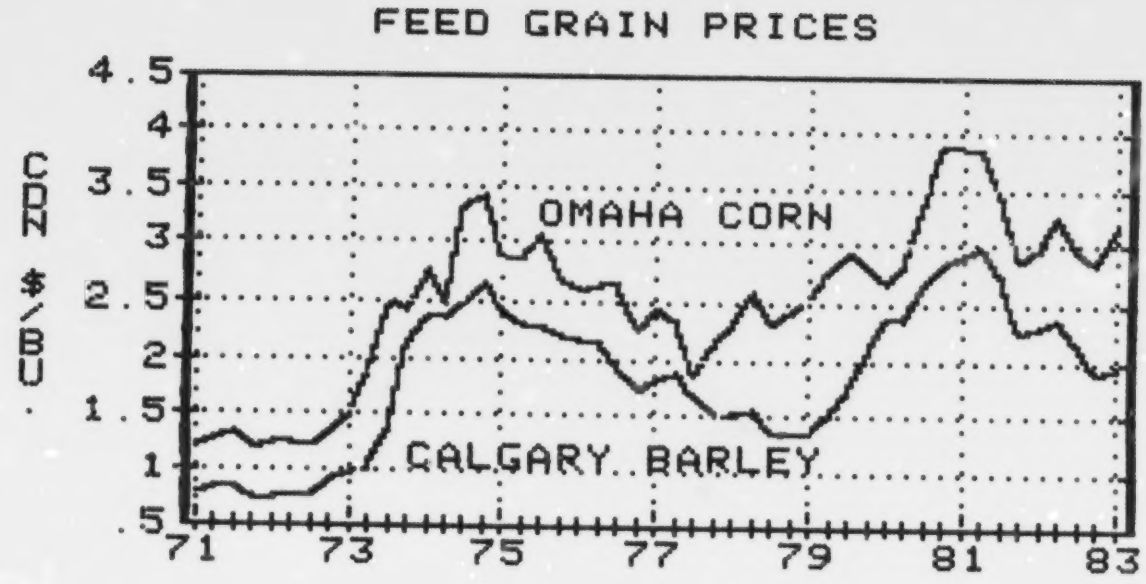
affected by the landed price of Western Canadian barley.

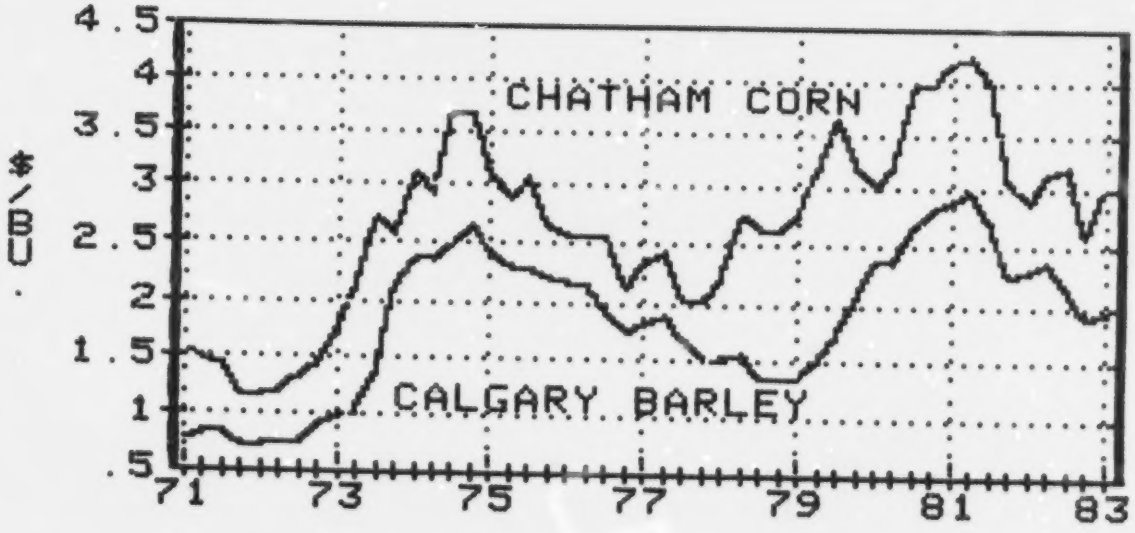
In the case of Canadian barley, U.S. barley is a perfect substitute in the export markets. Price differences, therefore, reflect differences in transfer costs which are lower for Vancouver and higher for Thunder Bay than they are for Minneapolis [Malmberg, 1980]. Based on export volumes, Vancouver is the major pricing point for Canadian barley.

Although the domestic livestock industry is the most important market for Canadian barley, the significance of exports suggests domestic prices should reflect the world price (Thunder Bay or Vancouver) with an adjustment for differences in transfer costs. During the 1981 crop year domestic utilization of coarse grains amounted to about 18.0 million tonnes, while exports accounted for only 7.2 million tonnes of which close to 80 percent was barley. Since August of 1976, when feed freight assistance was removed, Western barley has moved by rail under statutory rates (CROW) to Thunder Bay, and under domestic rates to points east as far as Montreal. A comparison of Alberta and Thunder Bay barley prices, however, indicates a volatile domestic barley market. During the 1969-79 period the price at Thunder Bay averaged $.31 per bushel above Alberta, and ranged between $1.21 higher and $.08 lower than Alberta prices [Malmberg, 1980].

Price movements in the Alberta non-Board barley market have followed similar patterns of adjustment to those of the Ontario and Omaha corn markets (Figure B-3). During the 1971-83 period, monthly Alberta barley prices were more closely related to Omaha corn prices (r = .912) than they

FIGURE B-3


FEED GRAIN PRICES
CDN $\BU
4.5
4
3.5
3
2.5
2
1.5
1
.5
OMAHA CORN
CALGARY BARLEY
71
73
75
77
79
81
83

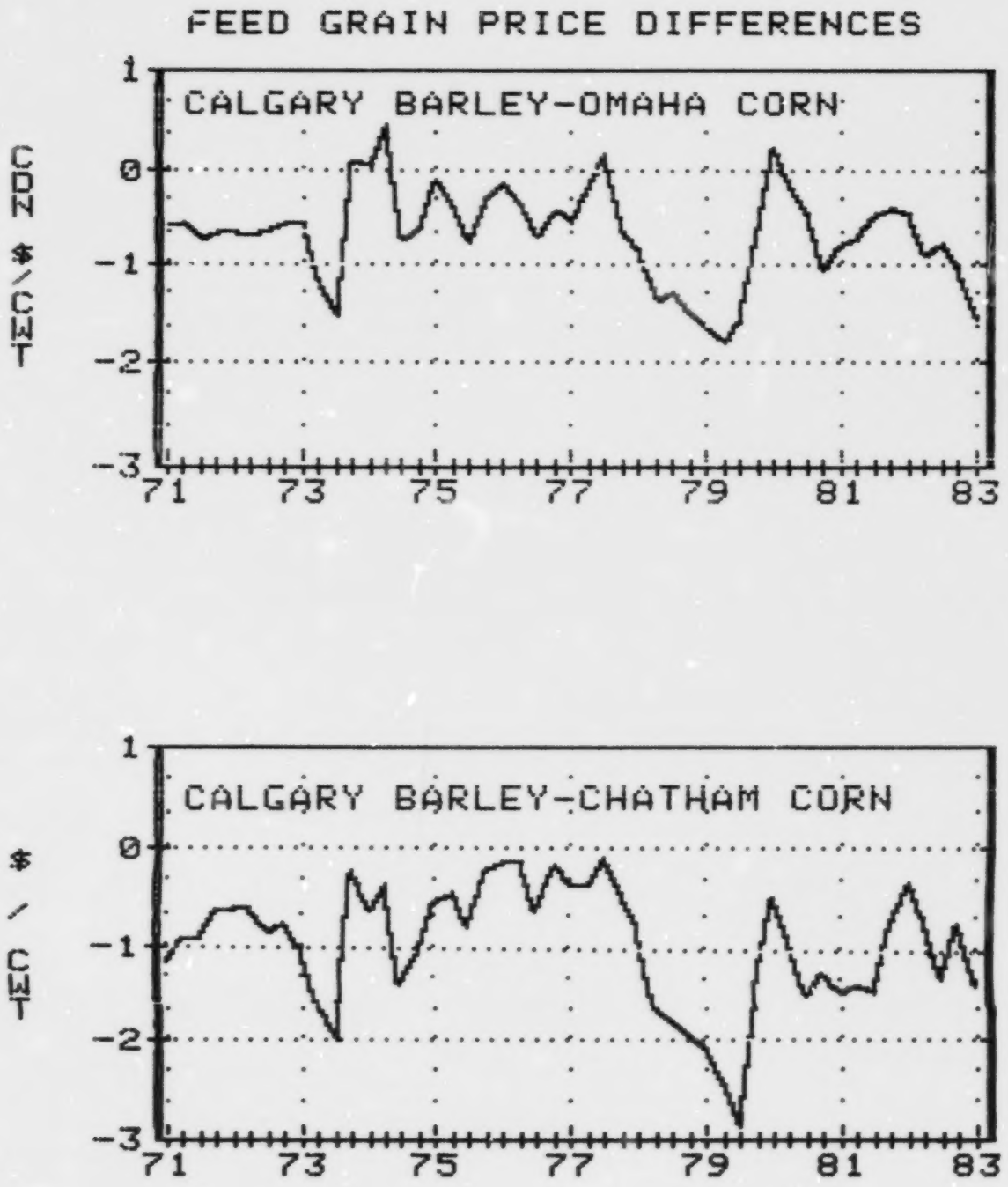

$\BU
4.5
4
3.5
3
2.5
2
1.5
1
.5
CHATHAM CORN
CALGARY BARLEY
71
73
75
77
79
81
83

were to Ontario corn prices (r = .883). Barley prices averaged $.85 per bushel lower than Ontario corn (range $2.03 lower to $.07 higher) and averaged only $.69 (Cdn) per bushel lower than Omaha corn (range $1.86 to $.02 lower) over the 12 year period. Alberta barley prices also displayed greater variation (coefficient of variation, CV = 35.5%) than either U.S. corn prices (CV = 21.9%), or Ontario corn prices (CV = 30.6%). Accordingly the range in price differences between the two corn markets was much narrower ($1.60 per bushel) than the range between Alberta and either Ontario prices ($2.10 per bushel), or U.S. Prices ($1.84 Cdn. per bushel).

The magnitudes of regional feed grain price differences suggest variations in the relative cost of feeding cattle in Alberta. Since the feeding values of barley and corn have remained constant over time, regional price differences should be expected to vary with the price level and changes in transfer costs. Although it is difficult to dissociate transfer costs from other factors affecting price relationships, corn prices appear to have increased relative to non-Board barley over time, possibly due to a trend in transfer costs or due to different levels of arbitrage with global feedgrain markets (Figure B-4). At least part of this increase is associated with the August 1976 removal of the $.26/cwt feed freight assistance on Western barley to most points in Ontario and Quebec. The Alberta - Ontario price difference increased by about $.20/bu. during the third quarter of 1976 (Appendix 3).

Variations in the regional feed grain price ratios clearly indicate that price differences have not been in proportion to feeding value (Figure B-4). On a hundred-weight basis, the relative price of Alberta barley

FIGURE B-4


FEED GRAIN PRICE DIFFERENCES
CALGARY BARLEY-OMAHA CORN
$/CWT
1
0
-1
-2
-3
71
73
75
77
79
81
83
CALGARY BARLEY-CHATHAM CORN
$/CWT
1
0
-1
-2
-3
71
73
75
77
79
81
83

fluctuated between 63 and 110 percent of the U.S. corn price (ave. 83.6%) and 56 to 97 percent of the Ontario corn price (ave. 79%) over the 1971-83 period. Barley price adjustments generally exceed, and tend to lag changes in the corn market. As a result, barley:corn price ratios appear to decrease then increase during periods of increasing feedgrain prices, and resist the initial downward movement in market prices. For example, quarterly price ratios remained high throughout the 1973(4) to 1977(3) and 1979(4) to 1982(3) periods, whereas, feedgrain prices generally declined from 1975 to 1978 and 1981 to 1983. Any potential Alberta advantage in feeding cattle, therefore, appears greatest during the initial phase of a period of increasing feedgrain prices, and following a period of decreasing corn prices.

(b) Silage Prices

The lack of available markets and, therefore, the absence of price information complicates the valuation of silages used in feedlot production. The high moisture content of silages makes transportation costs prohibitive other than for local delivery. As a result, silages are usually produced for on-farm use, or on a custom basis in close proximity to a feeding enterprise. Limited amounts of silages are grown for sale to local feeders, and such trades are not generally reported.

In the absence of market prices, alternative means of valuation are necessary for silages. To the contractor or purchaser of silages, nutrient cost in relation to those for other available feed sources is the primary consideration. In the case of the producer, whether silage is grown for

sale or on-farm use, the relevant value or price for silage is either it's opportunity cost, or cost of production depending on the availability of cropping and marketing alternatives. The choice of valuation method can, and often does, lead to very different prices for silages, usually depending on the intended purpose for the evaluation.

The opportunity cost for silages, or any other input used in feeding cattle is simply the value of these same resources in the best alternative use. The return (interest) on investment for example is an opportunity cost since the investment funds do have alternative uses. Similarily, operator labor and management have a value based on alternative uses, including off-farm employment. Where alternative land use, such as other cropping activities are available, silages should be valued at opportunity cost to reflect the best long term use of resources. Where production possibilities are limited to silage the opportunity cost is zero, in which case silage is valued according to the cash cost of production plus some return to labor, management and capital.

The concept of opportunity cost is a useful measure for decisions concerning alternative land use and feeding programs, but is not relevant to the short run situation (after the silage has been harvested) since the crop has only limited alternative use outside of storage. Once the crop has been harvested in the form of silage the producer is essentially committed to feeding livestock, the revenues inherent in other crop production no longer apply, and only the cost of producing the silage is relevant to feeding decisions. This, however, does not obviate the revenues from alternative land use from being lost to the total farming

operation. That is, the short run decisions simply involve the transfer of any profits from the cropping activity to the livestock feeding enterprise.

The opportunity cost of silage, as determined by corn or barley production, is used as a measure for the respective prices of Ontario and Corn Belt corn silage and Alberta barley silage prices used in this research. Although it can be argued that areas of expansion in beef feeding, particularly in Ontario, may not be suited to grain production and that silage production costs should be used, it is equally relevant that continued production in the major producing areas of both provinces is subject to alternative crop use. Silage prices are, therefore, determined as the revenue per acre of grain produced on a silage equivalent basis. Estimates of whole crop yields are calculated according to dry matter conversion rates of 12 bushels barley and 7 bushels corn respectively per ton of barley and corn silages. That is, silage price per ton equals grain price per bushel times conversion rate. These conversion rates are based on respective yield estimates and do not reflect change in relative values based on grain prices or supplement requirements which are discussed in Section (d).

(c) Beef:Feed Ratios

The beef:feed ratio provides a convenient, and frequently used, method of estimating changes in the profitability of feedlot weight gains (ie. feeding margins) resulting from changes in both slaughter cattle and feedgrain prices. The ratio (either beef:corn, or beef:barley) measures the amount of corn (barley) in bushels that are equivalent in value to 100

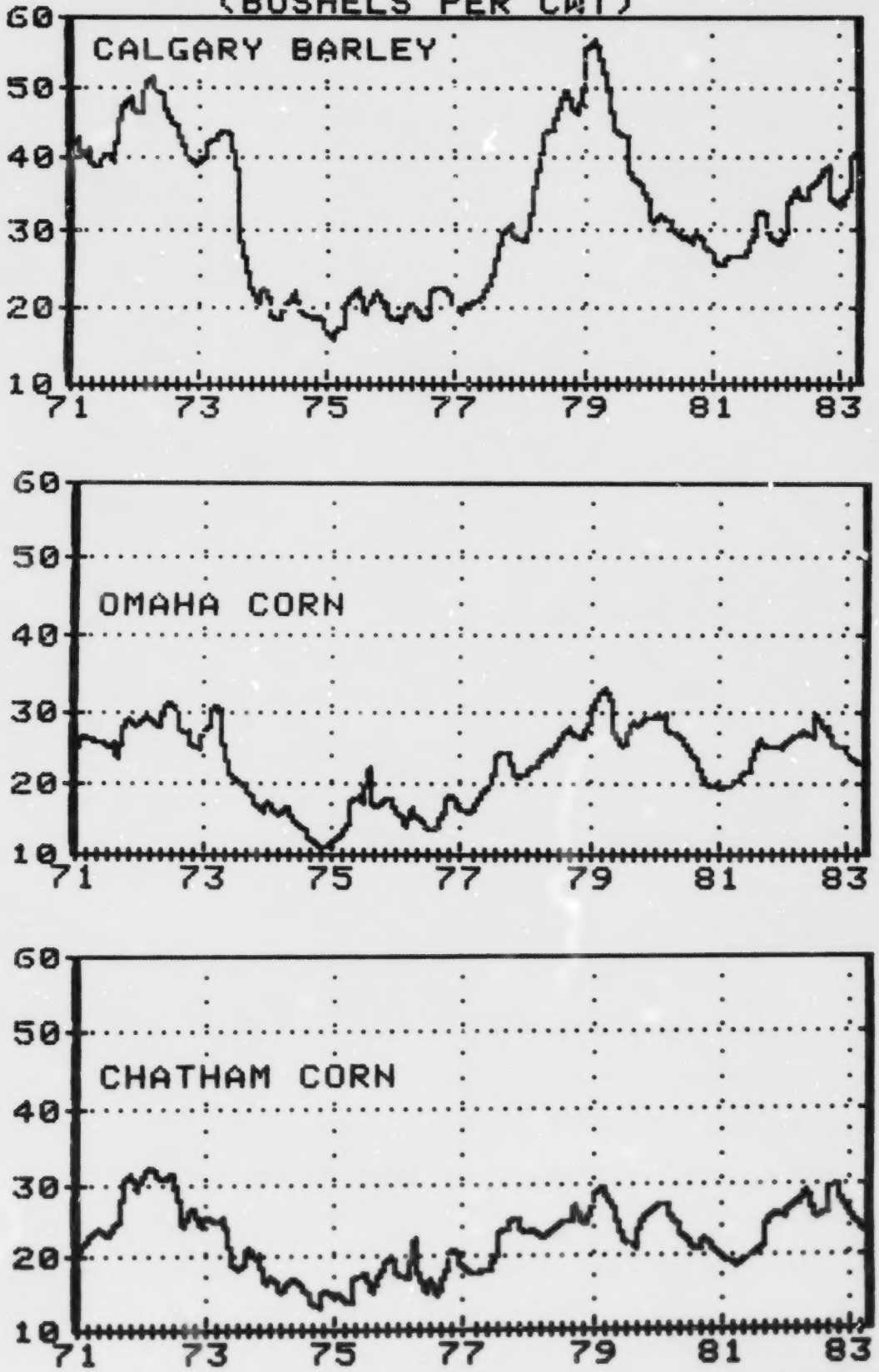
pounds of live slaughter cattle (usually A1,2 steers) at a particular time. That is, it is simply the ratio of the price of A1,2 slaughter steers to the price of corn (barley) per bushel. A major weakness of the beef:feed ratio is that it does not account for either changes in the kinds and amounts of feeds used in feeding cattle, or changes in feedgrain prices during the feeding period which affect the feeding margin. Considerable caution should, therefore, be exercised in using beef:feed ratios, particularly when interregional comparisons are involved.

A comparison of regional beef:feed ratios over the 1971-83 period suggests variations in the profitability of feedlot weight gains in Alberta have followed similar patterns to those experienced in Ontario and the Midwest United States (Figure B-5). Ontario and U.S. ratios followed almost identical paths averaging 22.14 bushels/cwt. in Ontario (range 12.7 to 32.2) and 22.51 bushels/cwt. in the U.S. (range 10.9 to 33.2). The higher average value for the U.S. (.47 bu/cwt.) suggests, that in terms of feed costs, cattle feeding was more profitable in the U.S. by almost half the average cost of a bushel of corn for each 100 pounds of feedlot gain. The beef:corn ratios peaked during the 1971-73 period (low grain prices relative to slaughter cattle prices) and for short intervals during 1978-79, 1980 and 1982. The ratio was relatively low during the 1974-77 period reflecting the rapid increase in feedgrain prices (1973-75) and depressed slaughter cattle prices (1975-77).

The Alberta beef:barley ratio followed the pattern of adjustments exhibited by the beef:corn ratios, but with a much greater amplitude. The Alberta ratio averaged 32.04 bushels/cwt. (range 15.3 to 56.7) over the

FIGURE B-5

BEEF:BARLEY AND BEEF:CORN RATIOS
(BUSHELS PER CWT)



1971-83 period. It should, however, be emphasized that the higher values for the Alberta ratio are largely the result of the differences in feeding values for bushel units of corn and barley. A bushel of barley contains about 20 percent less energy and 5 percent more protein than a bushel of corn. On a corn equivalent basis, both the amplitude and the level of the Alberta ratio would be reduced relative to the beef:corn ratios.

(d) Feed Cost Relationships

Direct comparisons of regional feedgrain prices and beef:feed ratios reflect changes in the relative feed costs and profitability of feeding cattle, but do not indicate the magnitude of differences in feed costs. The comparisons are based on bushel units which differ in terms of nutrient contents (primarily digestible energy and protein). The comparisons also fail to account for changes in protein-feedgrain price relationships which affect the relative values of the various feeds available for finishing cattle. Production in Ontario and the U.S. is oriented to corn and corn silage which require protein supplementation, whereas in Alberta, barley is the main component with varying amounts of cereal or corn silages and/or hay.

The feeding values of the feeds used in finishing cattle depend on their respective nutrient contents in relation to the requirements for growth (gain) of specific classes of animals. Finishing yearling cattle consume feeds, on a daily air-dry basis (90% dry matter), in amounts equal to about 2.3 to 3.0 percent of their live weight. At these rates of consumption protein requirements for 2.6 to 2.7 pounds daily gain are

approximately satisfied with barley, and about 77 percent satisfied with corn (Appendix 4). The energy content of these grains exceeds the requirements, but their silage counterparts are not adequate to achieve the prescribed rates of gain. Table B-4 presents the relative protein and energy values for selected feeds in comparison to barley for finishing yearling cattle (600 to 1100 lbs.).

TABLE B-4 RELATIVE PROTEIN AND ENERGY CONTENT OF SELECTED FEEDS FOR FINISHING YEARLING CATTLE (Barley = 100 Percent)

	TOTAL PROTEIN	DIGESTIBLE PROTEIN	DIGESTIBLE ENERGY
GRAINS (90% DM)			
Barley	100.0	100.0	100.0
Oats	94.3	92.6	92.1
Corn	81.3	75.3	109.1
SILAGES (90% DM)			
Barley	88.6	85.2	72.8
Oats	81.3	75.1	72.8
Corn	71.7	63.0	78.8

Calculations based on nutrient contents shown in Appendix 4.

The relative feeding values for the grains and silages shown in Table B-4 depend on the weighting (ie. price) applied to their respective protein and energy components. Alternatively, approximate values can be derived based on the price of barley as an indicator of energy values and the cost of protein necessary to adjust the protein content of the various feeds to a barley equivalent basis (ie. 11.07 percent). As a result, relative feeding values are variable depending on the prices for grains and protein supplement. Table B-5 summarizes the protein adjusted energy values and soybean meal requirements for determining the barley equivalent prices of selected feedgrains and silages.

TABLE B-5 BARLEY EQUIVALENT PROTEIN REQUIREMENTS AND ENERGY VALUES
(Basis 100 lbs., 90% DM, 11.7 Protein)

	GRAIN/SILAGE		SOYBEAN MEAL*		TOTAL ENERGY	
FEED GRAINS	LBS.	M CAL	LBS.	M CAL	M CAL	VALUE
Barley	100	148.50	0	0	148.50	1.000
Oats	98.1	134.20	1.9	2.81	137.01	.923
Corn	94.0	152.88	6.0	8.88	161.16	1.085
SILAGES						
Barley	96.3	104.00	3.7	5.48	109.48	.737
Oats	94.0	101.52	6.0	8.88	110.40	.743
Corn	91.2	106.70	8.8	13.02	119.72	.806

* Assumes 43.8% total protein and 1.48 M cal digestible energy (NRC)

Based on the protein requirements and energy values in Table B-5, and assuming a barley price of $100 per ton ($.05/lb) and soybean meal cost of $260 per ton ($.13/lb.) the barley equivalent feeding value of corn for finishing yearling cattle is about $98.90 per ton. That is, the barley equivalent value of corn equals the energy value of corn and soybean meal (1.085 x $100) minus the net cost of the protein added per ton (120 lbs. x $.08). The corresponding values for barley and corn silages are $24.10 and $23.65 per ton respectively on an as-fed (32% DM) basis.

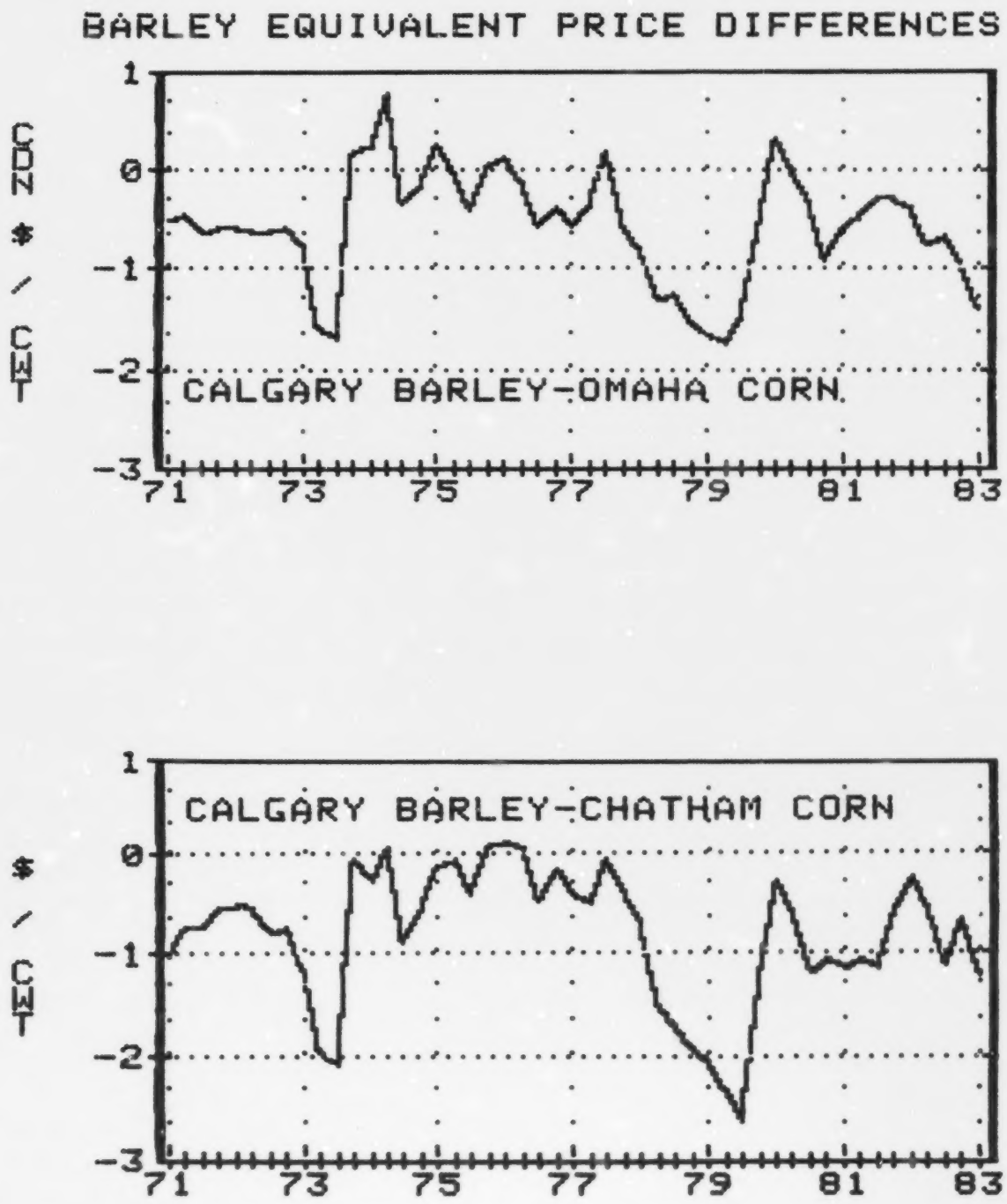
Although the value of barley silage for feeding cattle maintains a close relationship to that of barley, on an acreage basis silage may be a more profitable crop than grain. The cost of producing an acre of silage should be about the same, or slightly less than the cost of producing an acre of grain. Therefore, any increase in the dry matter yield of silage relative to that of barley would reduce the cost per unit of energy produced for silage as compared to grain. Based on the whole plant conversion rate of 12 bu. barley to 1 ton silage, a 70 bushel barley crop would yield either 3024 pounds dry matter and 4990 Mcal. per acre as grain,

or 3733 pounds dry matter and 4480 Mcal. per acre as silage. Increased silage yields of 20 percent (10:1 ratio) and 50 percent (8:1 ratio) would increase the energy yield from silage to 5376 Mcal. and 6720 Mcal. per acre respectively.

The assumed 12:1 forage conversion factor for barley silage provides a benchmark, or best estimate for average growing conditions in Alberta. This factor does not account for differences in relative barley-silage yields due to variations in annual growing conditions, soil types, fertilization rates, varieties, irrigation, and other factors. Should silage dry matter yields exceed those of barley by more than the amount necessary to offset the cost of protein supplements, then silage would be the more profitable crop.

During the 1971-83 period regional barley equivalent corn prices varied relative to the market price for corn depending on the price level for corn and protein supplement. Based on the U.S. wholesale soybean meal price (CDN $'s) as an indicator of protein values, the barley equivalent price of Ontario corn averaged $.14/cwt. below (range $.49 below to $.35 above) the market price for corn. Barley equivalent prices in the U.S. averaged $.10/cwt. below (range $.41 below to $.41 above) the Omaha corn price. The nutritionally adjusted corn prices (Figure B-6) were generally low relative to corn prices (Figure B-4) during periods of higher grain prices (1974-76 and 1980-83), and high relative to corn prices during periods of lower grain prices (1971-72 and 1977-79). As a result, any Alberta feeding advantage attributable to grain price differences would appear to be marginally larger than market prices would suggest during

FIGURE B-6


BARLEY EQUIVALENT PRICE DIFFERENCES
$ / CWT
1
0
-1
-2
-3
CALGARY BARLEY-OMAHA CORN
71
73
75
77
79
81
83
$ / CWT
1
0
-1
-2
-3
CALGARY BARLEY-CHATHAM CORN
71
73
75
77
79
81
83

periods of lower grain prices (ie. The nutritionally adjusted cost of corn exceeds it's market price in low grain price periods); while the Alberta advantage would tend to be marginally smaller during periods of higher grain prices. The reason for the change in corn price on a nutritionally adjusted basis is that the cost of protein supplement accounts for a smaller portion of feed cost during high grain prices and higher portion during low grain prices.

(e) Feeding Margins

The feeding margin, or margin above feed cost is an important determinant of the net revenues available to pay feedlot overhead and operating costs, as well as being an important profit component in feeding cattle. The margin is calculated simply as the difference between the revenues and feed costs attributable to the liveweight gain. That is, the price margin indicates net returns on the purchase weight of the feeder animal, whereas the feeding margin reflects revenues over feed cost on the weight added in the feedlot. Feeding margins tend to vary within and between regions with differences in the type and weight of feeder animals, feeds, feeding periods, and other factors, as well as feed and slaughter cattle prices. As a result, estimated regional feeding margins depend heavily on the assumptions made concerning several factors which affect the margins.

Regional feeding margins presented in this section are based on feeding programs selected to conform with both regional practices and reported USDA calculations for the Midwest United States (Table B-6).

Margins were estimated for feeding 600 pound good feeder steers to 1050 pound Choice/A1,2 slaughter weights, within approximate 6 month periods ending in March and September, for the years 1972 to 1983. The Corn Belt margins were estimated based on feed prices paid or received by farmers, as reported in the USDA Livestock and Meat Situation, and according to market prices for corn (Omaha No.2 Yellow) and opportunity cost for silage (1 Ton Corn Silage = 7 Bushels Corn). Alberta and Ontario estimates were based on market prices for grains (Chatham corn and Calgary non-Board barley) and opportunity costs for silages (1 Ton Barley Silage = 12 Bushels Barley).

TABLE B-6 REGIONAL FEEDING PROGRAMS
(600 to 1050 pound Steers)

	Per Day (lbs.)	Total Feed (lbs.)	Protein/day (lbs.)	Energy/day (M.cal.)
USDA CORN BELT 1)				
Corn	14	2520	1.26	22.68
Silage	18.89 (6.3)	3400 (1134)	.53	7.86
Supplement	1.5	270	.48	2.23
Hay	2.22	400	.22	2.15
TOTAL	36.61 (24.02)	6590 (4324)	2.49	34.92
ONTARIO 2)				
Corn	7.04	1443	.63	11.40
Silage	29.70 (9.9)	6089 (2030)	.84	12.36
Supplement	1.28	262	.41	1.90
Hay	5.54	1136	.55	5.37
TOTAL	43.56 (23.76)	8930 (4871)	2.43	31.03
ALBERTA (Silage) 3)				
Barley	17.82	3208	1.97	26.46
Silage	17.82 (5.94)	3208 (1069)	.62	6.84
TOTAL	35.64 (23.76)	6416 (4277)	2.59	33.30
ALBERTA (Barley) 3)				
Barley	19.72	3550	2.18	29.28
Hay	4.14	716	.41	4.02
TOTAL	23.86	4266	2.59	33.30

1) 180 days @ 2.5#/day = 450 lbs. gain; 9.6 lbs. feed (air-dry)/lb. gain.
SOURCE: USDA, Livestock & Meat Situation Reports.
2) 205 days @ 2.2#/day = 450 lbs. gain; 10.8 lbs.feed (air-dry)/lb. gain.
SOURCE: Derived from OCA Breeder & Feeder and University of Guelph.
3) 180 days @ 2.5#/day = 450 lbs. gain; 9.5 lbs. feed (air-dry)/lb. gain.

Historically, feedlot feeding margins have varied greatly in response to changing slaughter cattle and feedgrain prices. Throughout the 1960's and until late 1973 feedgrain prices were generally low resulting in mostly positive feeding margins and negative price margins. Relatively high grain prices (1974-75) and depressed slaughter cattle prices (1976-77) generated mostly low feeding margins during the 1974-77 period. Since 1977, feedgrain-slaughter cattle price relationships have resulted in more positive feeding margins.

Regionally, the Alberta margins varied over a wider range (Barley ration -$8.68 to +$53.82/cwt.), and the barley based program averaged higher ($20.08) than either the Ontario ($19.36) or U.S. ($15.47) margins (Table B-7).

TABLE B-7 REGIONAL FEEDING MARGINS (600 - 1050 lb.Steers)
(March and September 1972 to 1983)
Cdn. Dollars/cwt.

	ALBERTA		ONTARIO	CORN BELT	
	BARLEY	SILAGE 1)	SILAGE 1)	USDA	OP.COST 2)
Minimum	- 8.68	-11.35	- 6.88	-11.97	-10.81
Maximum	53.82	53.48	43.77	44.42	42.53
Average	20.08	18.48	19.36	15.47	15.28
Range	62.50	64.83	50.65	56.39	53.34

1) Barley (Corn) silage prices based on 12 bu. barley (7 bu.Corn)/ton silage.
2) Opportunity cost based on USDA estimates with Omaha No.2 Yellow Corn and Silage price based on 7 bu.Corn/Ton silage.

Over the 11 year period the estimated, semi-annual steer feeding margins followed very similar patterns regardless of the feeding program or method of pricing feed ingredients. Margins for the Alberta barley feeding program were lower than those for Ontario except during the 1972-73 and

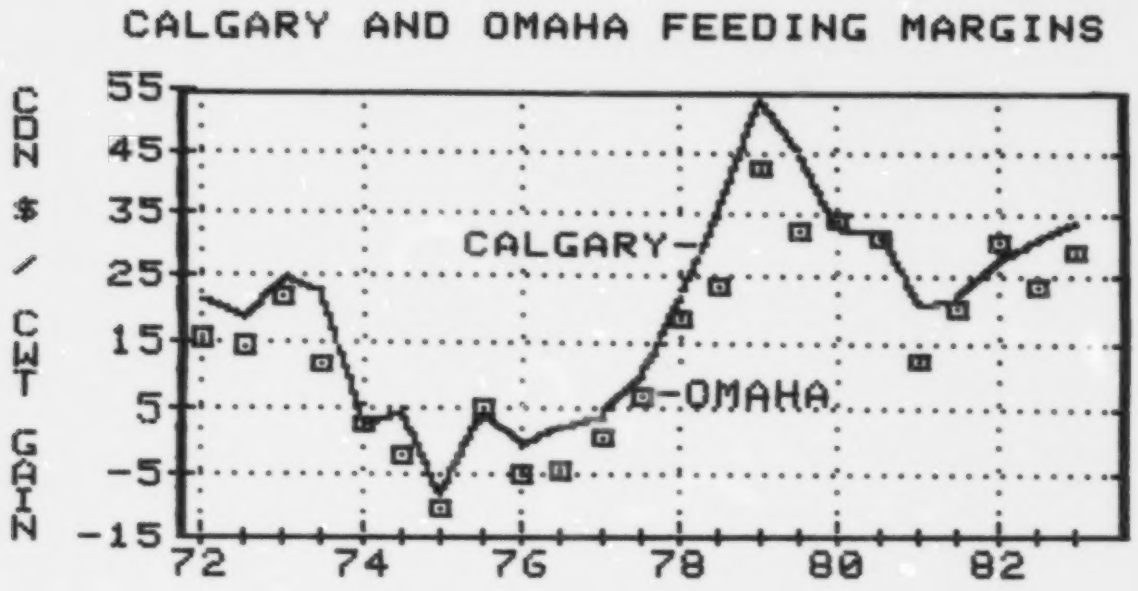
1978-79 periods, and generally higher than those for the U.S. (Figure B-7). Feeding margins in the U.S. were generally lower and less variable for estimates based on market prices for corn and opportunity costs for silage. The U.S. margins also averaged considerably less (ie. $3.01 to $4.80/cwt.) than estimated Canadian margins.

(f) Feedlot Profitability

Profits from feeding cattle accrue from the price and feeding margins after deducting the non-feed costs of feedlot production (ie. operating and overhead costs). There is evidence to suggest these costs are highly variable within regions depending on size and type of facilities, rates of feedlot capacity utilization, length of feeding periods and other factors, including management practices. That is, non-feed costs are to a large extent specific to particular feedlot situations and, therefore, are difficult to assess regionally. In the absence of accurate cost of production estimates, the returns above feed and feeder costs provide an indicator of the revenues available to cover non-feed costs and profits from feeding cattle.

Regional feedlot returns above feed and feeder costs for 600 to 1050 pound steers varied greatly over the 1972-83 period (Figure B-8). Although feeding margins are generally positive and tend to offset price margins, frequently both margins have either the same sign, or the price margin may be unusually large resulting in large positive or negative returns. For example, large negative price margins during March of 1974 and 1980 more than offset Alberta feeding margins resulting in substantial losses.

FIGURE B-7


CALGARY AND OMAHA FEEDING MARGINS
CDN $ / CWT GAIN
55
45
35
25
15
5
-5
-15
72
74
76
78
80
82
CALGARY
OMAHA

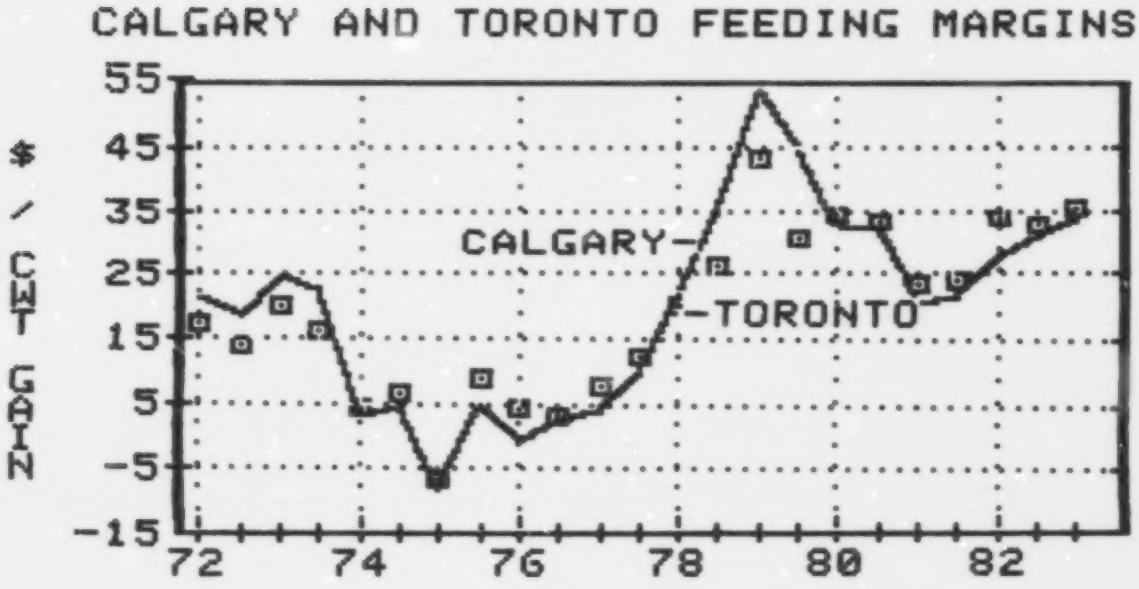
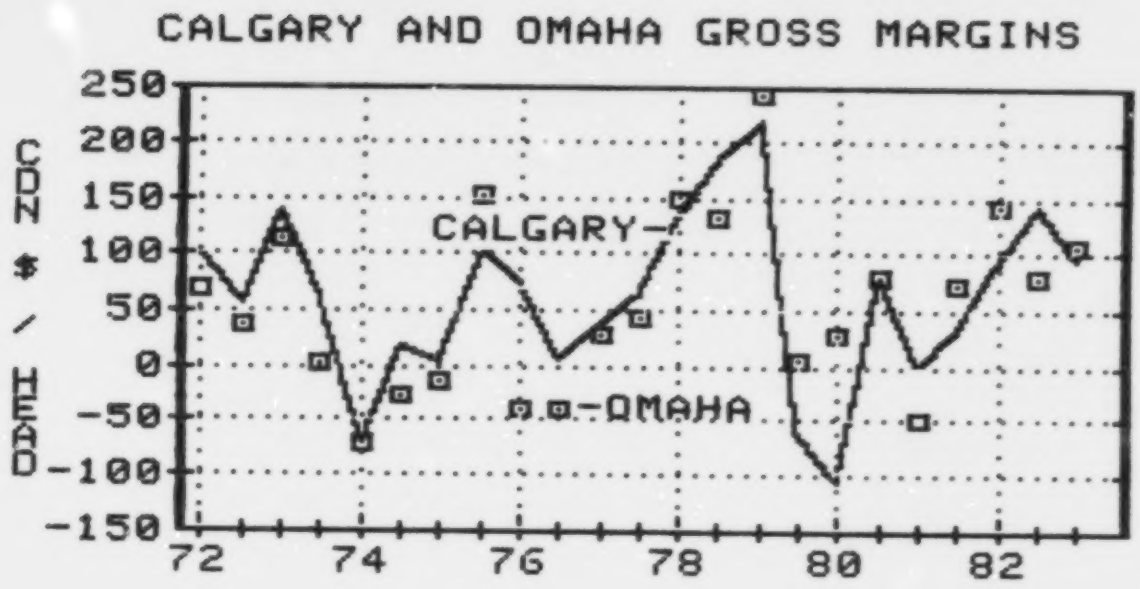
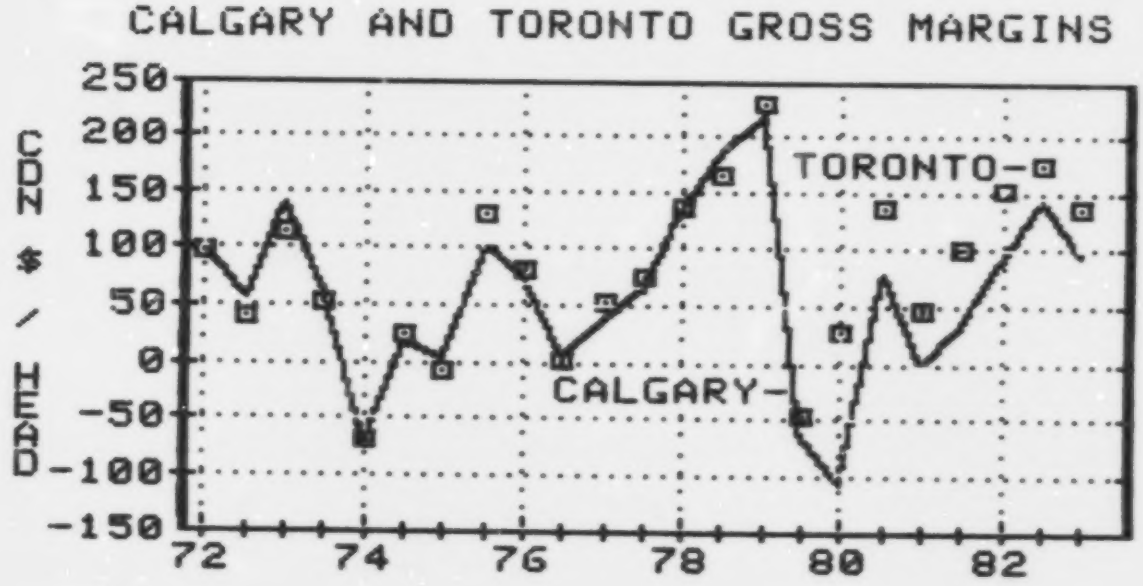

CALGARY AND TORONTO FEEDING MARGINS
$ / CWT GAIN
55
45
35
25
15
5
-5
-15
72
74
76
78
80
82
CALGARY
TORONTO

FIGURE B-8


CALGARY AND OMAHA GROSS MARGINS
250
200
150
100
50
0
-50
-100
-150
72
74
76
78
80
82
CALGARY
OMAHA


CALGARY AND TORONTO GROSS MARGINS
250
200
150
100
50
0
-50
-100
-150
72
74
76
78
80
82
TORONTO
CALGARY

Returns over feed and feeder costs in Alberta were usually higher than those for either Ontario or the Corn Belt until 1979. Since 1979, both feeding and price margins in Alberta have declined relative to the other feeding areas resulting in lower returns over feed and feeder costs in Alberta. Most of this decline can be attributed to relatively lower slaughter cattle prices in Alberta due to increasing transportation costs on meat shipments to Eastern Canada. The gross returns for Ontario outlined in Figure B-8 are based on feeding Ontario feeder cattle. For Western feeder cattle fed in Ontario, price margins are comparable to those experienced in the West. Therefore any advantage experienced by Ontario would be based largely on higher feeding margins.

3. TRANSPORTATION IMPLICATIONS

Transportation and other marketing costs have been an important determinant of regional comparative advantage in beef feedlot production. In general, the cost of transporting feeder cattle and calves has been less than the cost of transporting feed grains and slaughter cattle when both freight rates and live animal shrink are included. Similarly, carcass or boxed beef has been less expensive to transport than slaughter cattle. As a result, feeder cattle and calves generally move to grain and/or corn silage producing areas (Southern Alberta, Ontario, and Midwest U.S.), and beef moves from these areas to the feed deficit regions (B.C., Quebec, and coastal areas of the U.S.).

(a) Feed Grains

Rail shipments of Alberta non-Board barley to the livestock feeding areas of Eastern Canada have moved under statutory rates to Thunder Bay and domestic rates for local delivery in the East. Until 1984, the statutory (CROW) rate from Calgary to Thunder Bay has remained constant at $.26/cwt., while the domestic rate has increased annually since 1971 (except in 1973). Deliveries from Thunder Bay to the Toronto area (60 ton minimum box car loads) increased from $.45/cwt. (1971) to $1.47/cwt. (1982), and more than doubled since 1977 (Table B-8). Average rates reported to Owen Sound, Woodstock, and Ottawa were $.04/cwt. lower (1971-78) increasing to $.07 lower (1982) than the rate to Toronto [Canadian Livestock Feed Board].

Domestic rail transportation rates on feedgrain shipments to the Toronto area are representative of the average for the major cattle feeding areas of the province. These areas include the counties to the South and West of Toronto, most of which border either Lake Huron or Lake Erie (ie. Huron, Bruce, Middlesex, Elgin, Grey, and Kent counties). The shipment of Western barley to the Southern region of Ontario was subject to feed freight assistance of $.22/cwt. (1971), $.24/cwt. (1972-74), and $.26/cwt. (1974-76). The subsidy on Western grain shipments to the region was suspended in August 1976. As a result, the net freight cost on non-Board barley to Ontario producers increased by about 37 percent during the third quarter of 1976 (ie. from $.70 to $.96/cwt.), and has been equal to the domestic rate since 1976(3).

TABLE B-8 FREIGHT RATES ON WESTERN BARLEY TO TORONTO ($/cwt)

	CALGARY TO THUNDER BAY	THUNDER BAY TO TORONTO 1)	TOTAL FREIGHT	FEED FREIGHT ASSISTANCE 2)	NET FREIGHT
1971	.26	.45	.71	.22	.49
72	.26	.47	.73	.24	.49
73	.26	.47	.73	.24	.49
74	.26	.54	.80	.26	.54
75	.26	.64	.90	.26	.64
76	.26	.70	.96	.26	.70
77	.26	.77	1.03	-	1.03
78	.26	.83	1.09	-	1.09
79	.26	.93	1.19	-	1.19
80	.26	1.07	1.33	-	1.33
81	.26	1.27	1.53	-	1.53
1982	.26	1.47	1.73	-	1.73

SOURCE: Traffic and Tariffs Branch, Canadian Transport Commission
Auth: CFA 435J CTC(F) E 2300 min. 120,000 Standard Box Cars.

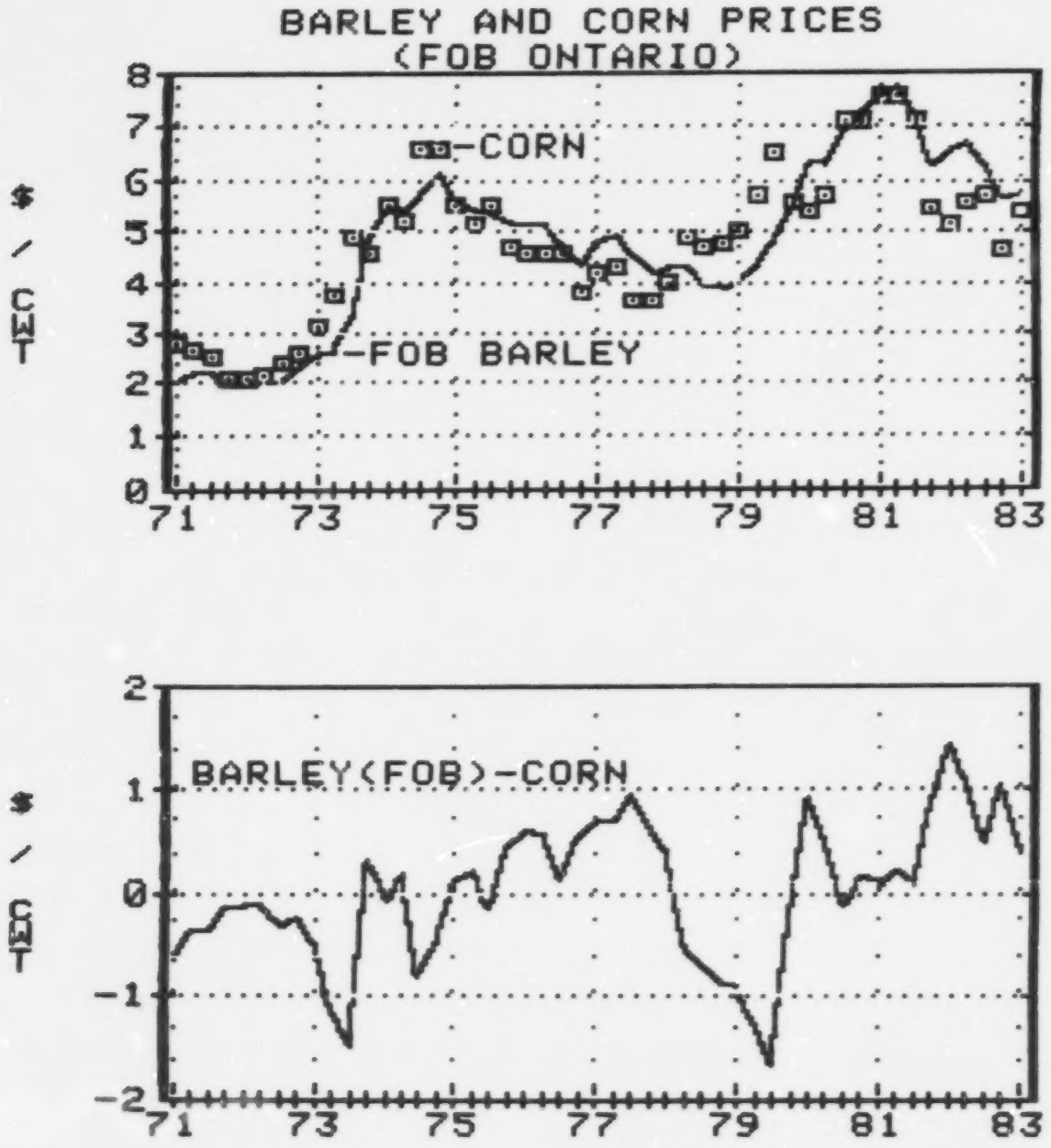
: Canadian Livestock Feed Board, Annual Reports.

1) Minimum 120,000 lbs. in standard box cars for local delivery.
Distance: Calgary-Thunder Bay (1244 mi) + Toronto 812 =2056 mi.

2) Rates apply to counties in Toronto area.

The landed price (ie. FOB Ontario) for Alberta non-Board barley explains some of the variation in feedgrain price relationships presented in the previous section. A comparison of corn and non-board barley prices in the Southern Ontario market also reveals distinct periods of high and low barley prices relative to those of corn for feeding cattle. During the 1971-83 period the non-Board price of barley FOB Toronto varied between $1.68/cwt. below and $1.41/cwt. above Ontario corn (Figure B-9). Price differences generally exceed transportation costs during periods of depressed feedgrain prices (1971-73 and 1978-80), and with only minor exceptions, were less than the cost of transportation during periods of relatively high feedgrain prices (1973-78 and 1980-83). Since the introduction of the free market feedgrain policy in May of 1974, low or

FIGURE B-9


BARLEY AND CORN PRICES
(FOB ONTARIO)
$ / CWT
8
7
6
5
4
3
2
1
0
-CORN
-FOB BARLEY
71
73
75
77
79
81
83
$ / CWT
2
1
0
-1
-2
BARLEY(FOB)-CORN
71
73
75
77
79
81
83

negative price differences have indicated that there have been periods (predominately 1978-79) when barley was relatively inexpensive compared to corn for feeding cattle in Ontario (excluding differences in feeding values).

The variations in price differences between barley and corn within the Ontario market suggest a lack of adequate arbitrage between the Alberta and Ontario feedgrain markets. Average quarterly price differences varied greatly during the 1971-83 period, and on 13 separate occasions fluctuated by as much as $.50 to $1.78/cwt. A major reason for this inefficient arbitrage may be the result of Canadian quota and rail car allocation policy. In the case of Ontario feedlots, on-farm corn and corn silage supplies, as well as reluctance to change feeding programs, may also condition producer response to changing price relationships.

The price relationships between Alberta non-Board barley and other feedgrain markets (export barley and Ontario corn) appear to be influenced by relative stocks-use ratios. During periods of surplus barley production (high stocks-use ratio, Appendix 5), such as in 1970, 1972-74 and 1978-80, non-Board barley prices declined relative to both export barley and Ontario corn prices. Conversely, periods of relatively low stocks-use ratios (1971-72 and 1975-78) have resulted in relatively small regional price differences. Any increase in transportation rates during these periods would likely be reflected in lower Alberta non-Board barley prices and a resulting increase in regional feedgrain price differences.

Anticipated improvements to the rail transportation system, should

they take place, could result in more efficient movement of prairie feedgrains to Eastern Canada, resulting in a reduction in the stocks-use ratio, more efficient arbitrage between the Alberta and Eastern Canadian feed grain markets, and higher prices for non-Board grains. In the case of export grains, rail capacity is likely only a minor factor affecting the barley stocks-use ratio. Inventory build-ups appear to occur primarily as a result of world market conditions, and Wheat Board priorities in exporting grains.

A major uncertainty facing the future growth of the livestock sector in Alberta, and other provinces, has been the proposed changes in the statutory freight rates (CROW) on Western grains moving into the export markets, or feedgrains moving to Thunder Bay. After several years of lobbying and negotiation the Federal Government passed "Crow" legislation. While there was general agreement that the railways required more revenue for grain transportation, the debate evolved into two major alternatives: Should the benefits be paid to producers, who in turn would pay the railways for their services; or should the benefits be paid directly to the railways? Most domestic grain users preferred the "pay the producer" approach, as producers would have paid compensatory freight rates, which would have then been reflected in grain pricing in the domestic market.

The final outcome of the Federal policy was basically "pay the railways"; however, grain shippers will pay a portion of freight costs over time, subject to several guidelines. It is not the purpose of this study to outline all the details of the new legislation, but an overview of the principles and possible implications regarding domestic grain pricing will

be provided.

Grain Shipper Costs - Alberta grain shippers will continue to pay the basic Statutory Rate which averages around 25 cents/cwt. or $5.51/T depending on the shipping point. In addition they will pay 3% inflation on railway costs through the 85/86 crop year and 6% thereafter. For any increases in the total volume shipped over a base volume (approx. 31 mln.T), the producers will pay the full rate. In effect, the rate paid by producers will be the basic Statuatory Rate, plus inflation cost, plus full rate for whatever volume increases may occur. However, the producer payment will have a ceiling subject to the average weighted price of wheat, oats, barley, canola, rye and flax. Producer freight rates will be limited to 4% of the weighted average in 1984, 5% in 1985, 8% in 1986, 9% in 1987 and 10% thereafter. Also freight rates will be subject to reduction based on transportation efficiency evaluations done each four years.

Simulations done up to the 1991/92 crop year based on a constant volume of shipments and based on inflation at 8% in 83/84, 7% in 85/86, and 6% after indicate producer costs increasing from approximately $5.75/T in 82/83 to $22 to $24/T in 91/92. Assuming that domestic feedgrains are priced on an export basis (stocks-use ratios are low), the freight deduction for local purchases would increase from 12.5 cents/bushel to 50 cents/bushel by 1991/92 (not allowing for possible reductions due to efficiency or for imposition of producer freight rate ceilings). In short, the "Crow Gap" or the difference between compensatory rates and statuatory rates has been guaranteed for the future for domestic grain users. This "gap" is estimated at compensatory $23.63/T minus Statuatory $5.51/T =

$18.12/T or 39 cents/bushel of barley in 1982/83. Using an 8:1 feed conversion, the Crow Gap will ensure a cost of production disadvantage of approximately $6.50/cwt. of gain in Alberta feedlots (when domestic feedgrain markets are priced on an export basis). Looking further to the future, freight deductions will be based on the blend of inflation and volume adjustments. Federal inflation predictions are 8% in 83/84, 7% in 84/85 and 6% thereafter; with producers' paying 3% up to 85/86 and 6% after. For feedgrain users, the Crow Gap is here to stay. While the "Future Gap" will be less than would have occurred without the new legislation, it will continue to erode the feedgrain users relative competitive position until such time as shippers are paying the full cost of inflation in rail shipping costs (subject to administrative details such as rate ceilings and efficiency adjustments).

(b) Feeder and Slaughter Cattle

Alberta brand inspection data indicates 306,599 animals were shipped out-of-province during 1980, of which 199,000 animals were destined for Eastern Canada. Agriculture Canada reports the movement of livestock East by truck and rail (rail only prior to 1978), but in terms of origins this information is not province specific. That is, shipments from Alberta may include animals marketed in Alberta from other provinces. During 1980 rail and truck volume from Alberta amounted to 223,940 head (Appendix 6). Most of these animals were feeder cattle (32,184) and calves (159,833). Slaughter cattle represented only 5 percent (10,528 hd.) of the total 1980 shipments to Eastern Canada. Total shipments from Alberta in 1982 were 205,761 head with 48,195 feeder cattle; 107,360 feeder calves; and 17,353

slaughter cattle.

The availability and cost of transporting cattle to Eastern Canada, particularly feeder animals, has been of concern to Ontario cattlemen for sometime. There is an apparent shortage of rail cars available during the peak fall period, and there is evidence to suggest the supply is diminishing. The attrition rate on cars is about 10 percent per year, and freight rates on live animals do not appear adequate for railways to replace obsolete cars to service a short peak period (3 months) with very limited backhaul opportunities. During 1982 the Canadian Pacific Railway had about 420 single and 200 double deck rail cars in service; about 50 fewer singles were expected to be in use during 1983 [OCA Breeder and Feeder, Oct. 1982]. Based on Agriculture Canada loading regulations for 500 to 549 pound feeder animals (maximum of 46 head per deck in 8' 6" cars and 50 head per deck in 9' cars), the loss of 50 singles deck cars is equivalent to about 2,300 to 2,500 fewer animals shipped per turn-around (Appendix 7). The railways instituted a detention charge of $50.00 per deck in 1981 as a means of improving the efficiency of rail car utilization. While rail capacity has been deteriorating, it appears that trucks have become more available to fill transportation needs for live cattle at competitive rates.

The cost of transporting Alberta cattle to markets in Southern Ontario has more than tripled since 1973, and has been mostly absorbed by Ontario buyers (Table B-9). Rail rates vary depending on the origin and destination points. Rates are lower from locations in Eastern Alberta (eg. Brooks is $58.30 and Medicine Hat is $185.50 lower per double deck than

Calgary); while rates to destinations other than Toronto - Midhurst are $189.00 higher (eg. Woodstock, Ayre and Bothwell). Based on the average October - December rates for 9 ft. wide double deck cars, the freight charges on feeder calves (550 pound ave.) from Calgary to Toronto increased from about $2.39/cwt. ($13.14/head) in 1973 to $7.48/cwt. ($41.14/head) in 1982.

An important observation concerning the cost of Alberta feeder calves to cattlemen in Ontario is that regional price differences for feeder cattle do not offset freight charges to Eastern Canada. On an annual basis the price of Alberta feeder calves is generally lower than the Ontario price (Table B-2), but during the peak fall marketing period, when most of the shipments occur, Calgary prices usually increase relative to Toronto. The higher Ontario slaughter cattle prices at the end of the feeding period (about 8 months), however, usually more than offset the added cost of Western feeders. For example in 1981 and 1982 the higher Al price in Toronto resulted in a $3.50 to $3.87/cwt. of finished animal Ontario advantage over Alberta for feeding Alberta feeder steers.

Excluding any shrinkage cost on slaughter cattle, regional price differences have usually more than offset the freight charges to Toronto. Based on Agriculture Canada loading levels for 1100 pound cattle (29 head per deck in 9 ft. cars) shown in Appendix 4 and carload rates presented in Table B-9, freight costs per hundred-weight are about 80 percent of the costs shown for feeder cattle. During the 1971-83 period, freight charges would have exceeded the average annual Calgary - Toronto price difference (Table B-1) in only three years (1976, 1978-79). Western Canadian

shipments of slaughter cattle to Eastern Canada declined sharply during these years from a peak of about 130,000 annually in 1974-75 to less than 11,000 in 1979. Volumes from Alberta have varied between 2,500 and 17,000 head annually since 1977 (Appendix 6). When the cost of shrink is taken into account, shipments of Alberta slaughter cattle to Eastern Canada are likely limited to short term periods when regional price differentials may justify the shipping of slaughter cattle. Live animal shipments must also compete with generally lower costs for shipping carcass beef to the Toronto and Montreal markets.

TABLE B-9 ALBERTA FEEDER STEER COST COMPARED TO ALBERTA AND TORONTO A1 STEERS

YEAR	FREIGHT TO TORONTO /CAR	/CWT.	/HEAD 1)	TORONTO-CALGARY A1 STEERS 2) PREMIUM/HD	NET/HD	NET/CWT.
1971	(1359)	2.59	14.24	34.10	+19.86	+1.80
1972	(1400)	2.67	14.68	42.90	+28.22	+2.56
1973	1255	2.39	13.14	34.98	+21.84	+1.98
1974	1255	2.39	13.14	33.00	+19.86	+1.80
1975	1996	3.80	20.90	26.07	+ 5.17	+ .47
1976	2360	4.50	24.75	37.07	+12.32	+1.12
1977	2360	4.50	24.75	26.84	+ 2.09	+ .19
1978	2497	4.76	26.18	28.71	+ 2.60	+ .24
1979	2715	5.17	28.43	72.71	+44.28	+4.02
1980	3092	5.89	32.40	77.44	+45.04	+4.09
1981	3703	7.05	38.78	77.33	+38.55	+3.50
1982	3925	7.48	41.14	83.71	+42.57	+3.87

1) Based on 550 pound feeder cattle.
2) Toronto minus Alberta A1 steer price - 1100 pounds, lagged 8 months after feeder animal purchase.

(c) Carcass and Boxed Beef

Historical information concerning the interprovincial movement of carcass and boxed beef in Canada has not been documented. Since trade

within Canada is relatively open, product flows freely from market-to-market with little intervention or regulation beyond that which would normally be associated with health and sanitation requirements. A study of the distribution of beef processed in Alberta indicated that about 76 percent of the province's total 1982 beef slaughter was shipped out-of-province as carcass, boxed or boned beef [Dawson, Dau and Associates, 1983]. Quebec and Ontario accounted for about 61 percent (380.4 M.lbs. carcass equivalent) and British Columbia 23 percent (144.2 M.lbs. carcass equivalent) of the total 1982 shipments (Table B-10). A majority of the Alberta beef shipments to other provinces and the U.S. are suspended carcasses moving by trucks. Rail transportation accounted for only 24 percent (147.5 M. lbs. carcass equivalent) of the total 625.8 million pounds shipped out-of-province during 1982, most of which (about 97%) was suspended carcasses to the Montreal market. All boxed and boned beef, except for a small amount to Quebec, was shipped by truck either directly or by piggyback.

Trucking facilitates more rapid movement and efficient delivery of boxed beef to the major Eastern markets (2-3 days) than rail transportation. Loading constraints, which limit stacking to seven boxes high, also result in inefficient utilization of railcar reefer capacity. Reefer car modifications to accommodate capacity rates of utilization could greatly improve the railway competitive position in the transport of boxed beef. In the case of carcass beef, rail transport to Eastern Canada has the added advantage of providing 5-6 days in-transit ageing; thus reducing industry warehouse requirements and costs [AERC, 1977].

TABLE B-10 ALBERTA BEEF SHIPMENTS BY RAIL AND TRUCK (1982)

	B.C.	P.Q.	ONT.	OTHER*	TOTAL
CARCASS BEEF					
Total(million lbs.)	67.3	247.0	41.6	32.8	388.7
Percent-Total	17.3	63.5	10.7	8.4	
-Truck	100.0	42.0	100.0	93.0	62.6
-Rail	-	58.0	-	7.0	37.4
BOXED AND BONED (Carcass equivalent basis)					
Total(million lbs.)	76.9	64.7	27.1	68.4	237.1
Percent-Total	32.4	27.3	11.4	28.8	
-Truck	100.0	96.8	100.0	100.0	99.1
-Rail	-	3.2	-	-	.9

* Includes about 20% shipped to the U.S.

SOURCE: Dawson, Dau and Associates, 1983.

Alberta beef shipments to Eastern Canada move either by rail in mechanically cooled reefer cars (mostly 60,000 pound capacity) or by truck (36-40,000 pound capacity). Truck tariff rates are competitive with the larger railcar rates on suspended beef, and substantially lower for boxed beef shipments. Transportation rates have increased by more than 250 percent since 1973 as a result of rapidly increasing energy costs and inflation. Rail tariff rates on suspended beef from Calgary to Toronto and Montreal are presented in Table B-11; rates for trucking appear in Appendix 8. Freight rebates shown for 60,000 pound cars have been calculated since 1976, on the basis of the 42,000 pound tariff adjusted by the excess rate on 18,000 pounds. For shipments to Montreal, the 60,000 pound rate (ie. $9.02 in 1983) reflects the railway charge for capacity utilization of the larger cars, but does not indicate the actual amount paid by packers ($11.31) since part of the savings in using the larger cars is rebated to the Montreal wholesalers.

Freight rebates on 60,000 pound railcars were originally negotiated by packers as an incentive for Montreal wholesalers to modify receiving facilities and adjust to handling sides instead of quarters of beef. Wholesalers claimed increased handling costs based on the necessity to unload carcasses prior to customer selection, and potentially lower quality shipments, as well as the cost of modifications to accommodate the larger railcars [AERC, 1977]. Packers agreed to compensate the Montreal wholesalers in the form of a rebate based on 75 percent of the difference in rates between 33,000 and 60,000 loads. The 33,000 pound rate class was discontinued in July of 1979. For the purpose of this report rebates were estimated according to the 36,000 pound minimum rate for cars under 40'7" (inside measurement). The estimated rebate increased more than 450 percent ($.50 to $2.29/cwt.) over the 1971-83 period as rates on smaller cars increased more, on both an absolute and a percentage basis, than the rate applicable to 60,000 pound cars (Table B-11).

Although it can be argued that the system of freight rebates was initially justified on the basis of increased costs to wholesalers, and that in the absence of such rebates these costs would have been translated into regional wholesale prices, there is an equity question concerning the present level of freight rebates. That is, the level of rebates is based on increased transportation costs which, other than for an inflationary component, do not necessarily reflect the trend in handling costs at the wholesale level. The substantial increase in transportation rates since 1973 has in large part been in response to rapidly increasing energy costs. It should also be realized that rebates are costs which are reflected in regional wholesale price relationships.

TABLE B-11 RAIL FREIGHT RATES AND REBATES ON SUSPENDED BEEF
(Calgary to Toronto and Montreal)

	33-36000 lbs. 1)	42000 lbs.	EXCESS ON 42000	60000 lbs.2)	VOLUME 3) DISCOUNT	ESTIMATED 4) REBATE	EFFECTIVE 60000
	——————(Dollars per cwt.)——————						
1971-3	4.07	-	-	3.40	.67	.50	3.90
1972-2	4.29	-	-	3.50	.56	.42	3.92
1973-11	4.29	4.06	-	3.50	.56	.42	3.92
1975-1	5.58	5.28	-	4.55	1.03	.77	5.32
-5	6.42	6.07	-	4.78	1.64	1.23	6.01
1976-1	6.74	6.36	2.00	5.05	1.69	1.27 (1.44)	6.32
-9	6.89	6.51	2.00	5.16	1.73	1.30 (1.47)	6.46
1978-1	7.23	6.84	2.00	5.39	1.84	1.38 (1.57)	6.77
1979-1	7.93	7.25	2.12	5.71	2.22	1.67 (1.67)	7.38
-7	7.95	7.52	2.20	5.92	2.03	1.52 (1.75)	7.44
1980-1	9.68	9.15	2.68	7.21	2.47	1.85 (1.76)	9.06
-5	9.97	9.42	2.76	7.42	2.55	1.91 (1.76)	9.33
-9	10.20	9.64	2.82	7.59	2.61	1.96 (1.85)	9.55
1982-1	11.42	10.80	3.16	8.51	2.91	2.18 (2.18)	10.69
1983-1	(12.07)	11.45	3.35	9.02	3.05	2.29 (2.32)	11.31

SOURCE: Canadian Freight Association Tariff 103-U item 5180
1) 36,000 pound minimum replaced the 33,000 pound rate July 1979
2) 1976 to 1983 calculated based on 42,000 pound rate and excess rate on 18,000 pounds ([$11.45 x 420 + $3.35 x 180]/600 = $9.02).
3) Difference in rates on 33,000(36,000) and 60,000 pounds.
4) Based on 75 percent of the reduction in rates for 60,000 pound cars. Amount would be less depending on the actual weight shipped. Numbers in brackets obtained from industry sources.

The pricing impact of rebates is significant, as it is also applied to truck shipments (except boxed beef). While it has been suggested that the Montreal wholesale advantage over Toronto offsets the rebate, the question remains, "If there was no rebate and Montreal wholesalers charged a fee for their services, what would the Montreal-Toronto wholesale differential be?". One can speculate that the wholesale price difference would be unchanged as Montreal wholesale would still reflect freight over Toronto, while at the same time the Alberta wholesale would reflect Montreal

wholesale minus freight and handling charges. Another important aspect of the rebate is the fact that all carcasses sold to Alberta and B.C. retailers are priced at Montreal wholesale minus freight and rebate. Any overstatement of handling costs in the rebate mechanism results in additional wholesale price deductions in the Western Canadian market.~

4. ONTARIO FEEDER CATTLE IMPORTS

The flow of feeder cattle and calves to Eastern Canada, alluded to in the previous section, constitutes an important component of the total Ontario beef supply. The province's share of the annual Canadian fed-beef slaughter (A,B and C grades) has remained relatively stable at about 32 to 34 percent, while feeder cattle production, as measured by the number of cows on farms, declined from 17 to 11 percent of national production over the past three decades. During the 1973-80 period, the annual fed-beef slaughter in Ontario increased by about 30 percent (189,000 head) suggesting an increasing dependence on out-of-province feeder cattle supplies.

Information concerning the inter-provincial or international movement of feeder cattle and calves is not sufficiently detailed to permit calculation of the proportion of Ontario's steer and heifer slaughter originating with out-of-province feeder animals. Imports from the United States have been severely limited by Canadian bluetongue and anaplasmosis restrictions, although exports have at times been significant from both Eastern and Western Canada. Annual feeder cattle exports from the Eastern region varied from a few animals to more than 45,000 head during the past

decade with the largest movements occuring in 1973 and 1979-80 (Table B-12). These shipments were greatly exceeded by the inward movement of feeder cattle and calves from Western Canada.

TABLE B-12 FEEDER CATTLE EXPORTS, 1971-80

	WEST	EAST	TOTAL
1971	10695	4525	15130
1972	48920	3164	52084
1973	103200	24967	128167
1974	8510	1599	10109
1975	27602	1160	28762
1976	50749	3944	54693
1977	97493	626	98119
1978	53586	8968	62554
1979	37847	23752	61599
1980	33327	45716	79043

SOURCE: Agriculture Canada, Annual Livestock Market Reviews.

Since 1977, when truck movements were first reported, more than 80 percent of the cattle and calves shipped to Eastern Canada have been feeder animals, and about 1/3 of these originated from shipping points in Alberta (Appendix 6). These shipments from Western Canada also appear to be the source for over 60 percent of Ontario's steer and heifer slaughter.

Ontario cattle feeders strongly support the removal of import restrictions on U.S. feeder cattle to provide greater access to the U.S. Midwest and Southeast (West Virginia, Virginia, and Kentucky) feeder cattle markets [OCA, Dec. 1982]. The Ontario Cattlemen's Association recently investigated the potential for sourcing stocker cattle from these markets which are accessible by truck and located less than half the distance from Southern Ontario to Calgary [OCA Sept. 1983]. Rapidly increasing transportation costs, declining rail service during the peak fall period,

and uncertainty regarding the future availability of Western feeder cattle are cause for concern among Ontario feedlot operators. Any reduction in the normal flow of feeder cattle to Eastern Canada would generate considerable pressure for change in the regulations concerning U.S. feeder cattle imports.

Ontario cattlemen's concerns over the cost and availability of Western feeder cattle do not appear to have been justified in terms of regional price relationships. As indicated in a previous section, higher prices for Alberta feeders and increasing transportation costs have usually been more than offset by higher slaughter cattle prices in Toronto, especially in 1981 and 1982. A review of truck and rail shipment data (Appendix 6) does not provide any evidence to suggest that reduced rail capacity has not been absorbed by the trucking industry. During 1982 the total feeder cattle shipments to Eastern Canada increased by about 43,000 head over the previous year.

The importation of large numbers of U.S. feeder cattle into Eastern Canada could have a significant impact on price relationships in the Canadian beef industry. At the outset, the increased competition from Ontario buyers in the proposed U.S. markets, in conjunction with reduced participation in Western Canadian markets, would most likely result in reduced Canadian feeder cattle prices relative to those in the U.S. Should lower prices fail to generate an equivalent flow of Western feeder cattle exports to the U.S., the resulting increase in fed-beef production could result in an export basis pricing situation for Canadian slaughter cattle. Canada presently fills its allowable quota of beef exports to the U.S., and

any increase in exports would be limited to live animal shipments. As a result, the assumed benefits of improved access to U.S. feeder supplies may be less than anticipated by Ontario cattle feeders.

5. BEEF CARCASS GRADING SYSTEMS

The Canadian beef carcass grading system includes five major quality groups (designated by letter grades, two of which (C and D) are further stratified resulting in nine quality grades. The two immature, or youthful quality grades (A and B) are subdivided into three weight classes (300-499, 500-699, and 700+ lbs.) and four fat levels (numbers 1 to 4). Effective January 1984, the standards were amended to: 1) consolidate weight classifications into one group (150 kg or 330 lbs. and over), 2) adjust fat levels slightly downward, 3) knife-rib carcasses and measure fat thickness between the twelfth and thirteenth ribs, and 4) eliminate meat texture as a qualitative criteria. The allowable fat thickness within yield grades is also less than the prvious maximum for most carcasses (500-699 lbs.). Knife ribbing between the twelfth and thirteenth ribs will make the system consistent with U.S. grading procedures.

In the United States, yield grade standards for carcass beef have been available, on an optional basis, since 1965. By late 1972, when the Canadian system was adopted, about 40 percent of the beef processed in the U.S. was subject to yield grading. In 1974 the USDA proposed the elimination of conformation criteria from quality assessment, uniform marbling requirements for the A maturity grades (9 to 30 months), and compulsory yield grading for all quality graded carcasses [Nelson and Van

Arsdall, 1976]. After considerable controversy the new standards were put into effect in February 1976. By 1981, approximately 75 percent of the grain-fed beef produced in the U.S. was quality and yield grade [USDA Backgrounder, 1982]. A 1982 USDA proposal to reduce marbling requirements, by about one level in each youthful grade, to allow leaner beef to qualify for the Prime, Choice and Good grades, was turned down by the U.S. beef industry.

The U.S. beef carcass grading system, although similar to the Canadian system in terms of criterion, is more detailed and complex than Canadian standards. Within the youthful grades (Canada A and B), the U.S. system includes four quality grades (Prime, Choice, Good and Standard), two sexes (steers and heifers) five yield grades (numbered 1 to 5), and four weight classes (100 lb. increments from 500 to 900 lbs.). The major differences between the two systems are the separation of quality and yield grades, and the importance of marbling as a quality determinant in the U.S. system. Marbling is evaluated on a scale of one to ten with one indicating the greatest degree of marbling. Within the youthful (A maturity) grades, quality differences are based on levels of marbling ranging from practically devoid to traces (10-9) for Standard, slight (8) for Good, small to moderate (7-5) for Choice, and slightly abundant to very abundant (4-1) for the Prime grade. Quality grades also reflect differences in color and texture of ribeye lean ranging from light red fine texture for the Prime to slightly dark, moderately fine texture for the Standard grade.

United States yield grades are determined on the basis of a formula which accounts for differences in the thickness and distribution of

external fat (adjusted fat thickness); amount of kidney, pelvic and heart fat; ribeye area; and hot carcass weight, or 102 percent of the chilled carcass weight.

that is:

Yield Grade = 2.5 + (2.5 X adjusted fat thickness, inches)
+ (0.2 X percent kidney, pelvic and heart fat)
+ (0.0038 X hot carcass weight, pounds)
- (0.32 X ribeye area, square inches)

External fat thickness is measured between the twelfth and thirteenth ribs at a point perpendicular to the outside surface and 3/4 of the length of the ribeye from its chine bone end. The measured fat thickness may be adjusted up (down) depending on any unusual increase (decrease) in fat cover in other carcass areas (brisket, plate, flank, cod or udder, inside round, rump and hips). Each 4/10 inch change in adjusted fat thickness over the ribeye is equivalent to a change of one yield grade. Industry sources suggest adjustments of more than 2/10 inch would reflect excessive differences in the distribution of external fat cover. The location of the U.S. fat measure overstates fat thickness compared to the Canadian system which is based on the minimum point in the fourth quarter from the vertebrae.

Ribeye area is usually subjectively determined, but may be measured by means of a grid or other USDA approved device. A change of one square inch in ribeye area is equal to a .3 change in yield grade with the larger area resulting in a lower yield grade number (ie. negative sign in formula). Ribeye area provides additional information on potential "yield" and retail value, but was excluded from the Canadian system on the basis of the degree of carcass ribbing that would be required for objective measurement

[Fredeen, 1975]. In general the ribeye area is an increasing function of carcass weight and likely as variable, within carcass weight groups, in Canada as in the United States. Ribeye area is, however, an important factor to U.S. buyers and should be taken into consideration in any carcass or loin exports to the U.S.

Internal carcass fat in the kidney and surrounding area (Kidney Knob), pelvic area of the loin and round, and heart area of the chuck and brisket is subjectively determined as a percent of hot carcass weight. Each one percent increase (decrease) in internal fat from the average of 3.5 percent results in a 0.2 increase (decrease) in the yield grade number. Removal of internal fat from carcasses would appear to be equivalent to a .7 increase in yield grade (ie. lower number).

Carcass Weight, which is being removed as a factor in Canadian standards, is not a significant determinant of yield grades for most U.S. slaughter cattle. Yield grades decline by only 1/5 grade for each 50 pound increase in carcass weight. Removal of kidney, pelvic and heart fat from Canadian carcasses explains about 25 pounds of the difference in average U.S. and Canadian carcass weights (based on 715 pound average U.S. weight).

Direct comparisons of U.S. and Canadian yield grades are complicated by differences in carcass descriptions and grading procedures. Removal of internal fat suggests a higher retail yield for Canadian carcasses of the same yield grade, but differences in fat thickness measurement criteria may understate the U.S. yield and to some extent offset this advantage. Based on the U.S. and Canadian yield grade standards, shown in Table B-13, a

close relationship appears between yield grades in terms of acceptable levels of external fat thickness. The present Canadian standards allow a higher level of external fat in each yield grade (excluding U.S. 5) for both the 500-699 pound (U.S. 500-600 lb.) and over 700 pound (U.S. 700-800 lb.) carcass weight classes. The minimum acceptable fat thickness within the U.S. 2, 3, and 4 yields is lower for the 500-600 pound class and higher for the 700-800 pound class than the minimum levels in the corresponding Canadian grades.

TABLE B-13 CANADA AND U.S. YIELD GRADES FOR CARCASS BEEF

YIELD GRADE	1 FAT (in)	2 FAT (in)	3 FAT (in)	4 FAT (in)	
CANADA A					
300-499 lbs.	.2 -.3	.31 -.5	.51 -.7	over .7	
500-699 lbs.	.2 -.4	.41 -.6	.61 -.8	over .8	
over 700 lbs.	.3 -.5	.51 -.7	.71 -.9	over .9	
JANUARY 1984					
330 lbs. +	.157-.354	.354-.551	.551-.748	over .748	
or 150 kg.+	4-9 (mm)	9-14 (mm)	14-19 (mm)	over 19(mm)	
YIELD GRADE	1 *	2	3	4	5
UNITED STATES					
500-600 lbs.	.3	.3 -.5	.5 -.7	.7 -1.0	over 1.0
ribeye area (sq.in)	11.5	11.5-10.5	10.5-9.5	9.5-9.0	under 9.0
other fat (%)	2.5	2.5- 3.5	3.5-4.0	4.0-4.5	over 4.5
700-800 lbs.	.4	.4 -.6	.6 -.8	.8 - 1.1	over 1.1
ribeye area (sq,in)	16.0	15.0	14.0	13.5	under 13.1
other fat (%)	2.5	3.5	4.5	5.0	over 5.0

* Upper limits within the highest yield grade.
SOURCE: Neil Peterson, Livestock Program Specialist, Agriculture Canada.

Effective January 1984, the acceptable fat thickness within Canadian yield grades for all carcasses over 350 pounds is about equal to those for the U.S. 600-700 pound class, excluding differences due to grading

procedures. The reduction in acceptable fat levels for the 500-699 pound carcasses will probably result in a moderate reduction in Canadian carcass weights relative to those of the United States. Producers will need to adjust weights, as in the short term more A3 grades may be expected due to lower fat specifications.

The most important difference between the U.S. and the present Canadian carcass grading standards is the marbling requirements in the youthful quality grades. About 85 percent of the U.S. fed beef is graded Choice on the basis of marbling scores of 5 to 7 (ie. small to moderate marbling). Industry sources suggest this level of marbling would be equivalent to that exhibited by Canada A3 and A4 carcasses. Most of the A1 and A2 carcasses contain only slight marbling (marbling score of 8) which is consistent with the U.S. Good grade requirement. During 1982 about 90 percent of the Canadian steer and heifer carcasses graded A1 and A2, whereas only 7 to 8 percent graded A3 and A4. The recently rejected change in U.S. standards would likely have qualified a significant part of at least the Canada A2 carcasses for the U.S. Choice grade. The slightly reduced fat levels in the 1984 Canadian standards will result in even fewer Canadian carcasses qualifying for the U.S. Choice grade.

Information concerning the impact of differences in carcass definition, grading standards, and retailer purchasing specifications on the relative returns of U.S. and Canadian producers and processors has not been documented. There is, however, some evidence to suggest the possibility of more positive, or perhaps less negative, impacts on both sectors of the U.S. industry. Processing efficiency in the United States

is enhanced by heavier carcass weights (40 to 50 pounds) and higher dressing percentages (4 to 5%). The average dressing percentage for steers is about 56 - 58 percent in Canada compared to 60 - 63 percent in the U.S. At least part of this difference is due to kidney, pelvic and heart fat (about 3.5% of carcass weight) included in the U.S. carcass. Canadian processor returns, therefore, would be lower than those of U.S. processors (for given prices) by at least the difference in value of the excluded internal fat.

The increasing quality levels attributed to higher marbling scores in the U.S. grading system provide cattle feeders with an important profit increment not available to their Canadian counterparts. The U.S. system facilitates increases in the price margin (ie. spread between feeder cattle purchase and slaughter cattle prices) through further feeding to a higher quality grade. Choice steer prices, for example, average 7 to 10 percent above Good steers on the Omaha market. This incentive to feed cattle to grade Choice obviously exceeds the discounts for any reduction in yield grade since most U.S. fed cattle grade Choice with an average yield grade of 3. In the absence of quality premiums, the discounts for higher fat levels under the Canadian system have removed any incentive to feed to heavier, more highly finished slaughter weights (about 90% of fed cattle slaughter grade A1 and A2). U.S. producers also benefit from any positive feeding margins on the additional slaughter weights, as well as any distributional effects from improved efficiency at the processing level.

The 1984 changes in the Canadian grading system, particularly ribbing procedures, may enhance the export potential for carcass beef in the United

States, providing price relationships are conducive to trade, and carcass weights meet U.S. buyer specifications. Most A1 and A2 carcasses will continue to be equivalent to low Choice and Good U.S. carcasses as a result of marbling deficiencies, but this could prove an asset in terms of the U.S. wholesale and retail buyer's yield specifications. Unpublished tests sponsored by Alberta Agriculture (International Marketing Division) and the Alberta Cattle Commission (December, 1981) indicated that Alberta A1 and A2 beef carcasses averaged 3 percent greater yield of primals and 6 percent higher credit values than U.S. carcasses. As a result, A1 and A2 carcasses should command a 5 percent premium over U.S. carcasses. It should also be emphasized that major resistance to the USDA's proposed lowering of marbling requirements which was based on recent research evidence, appears to have been limited to Packer concerns over processing efficiency and certain consumer groups' association of marbling with quality. Canada A grade carcasses would probably not be detected by U.S. consumers since the difference in marbling requirements from the average Choice grade is not great, and Canadian regulations do not require "roller branding" of carcasses destined for export.

6. GOVERNMENT STABILIZATION PROGRAMS

Two federal programs (Agricultural Stabilization Act and Feed Freight Assistance Act) and a host of provincial programs have been instituted as a means of either protecting or enhancing the level of farm incomes in Canada. The Agricultural Stabilization Act, introduced in 1958 and amended in 1975 (Bill C-50), is directed to maintenance of agricultural productive capacity for selected commodities during short term adverse price

conditions. The current level of support is based on 90 percent of the average market price over the previous 5 years, plus the difference between the current and preceeding five year average cost of production. Payments are made annually out of consolidated revenues with no producer premium participation. Table B-14 outlines payments under the act to beef producers for cattle (1976) and calves (1977).

According to Federal Agricultural Stabilization Board annual reports and Agriculture Canada Statistics, the beef industry accounted for about 2.6 percent ($46.5 million) of the total expenditures under The Board over the 17 year period ending March 1975. Dairy products and dairy pricing accounted for over 87 percent of the total expenditures, while hogs received about 3.5 percent. Since 1975 total payments have increased with the beef industry accounting for about 3.5 percent ($80.1 million) and hogs about 6.5 percent ($148.6 million).

TABLE B-14 FEDERAL STABILIZATION PAYMENTS TO THE BEEF INDUSTRY

	CATTLE		COW-CALF	
	Number of Producers	Payment (million)	Number of Producers	Payment (million)
B.C.	281	.712	2315	.630
Alta	16532	24.034	22684	10.608
Sask	13500	6.698	21396	8.188
Man	7730	5.026	9505	2.999
Ont	15166	18.220	14092	1.459
P.Q.	1033	.335	3109	.447

SOURCE: KenAgra Management Services, Report prepared for Alberta Economic Development (1981).

A major weakness in Federal Bill C-50 was the top-loading clause which opened the way for provinces to develop their own stabilization programs.

Provinces commenced to develop their own plans with the thought that should a Federal payment occur, the provinces would simply top-load the Federal payment and save some cost to provincial treasuries. Another problem in the Federal plan was the guarantee level itself. While all named commodities were guaranteed a support level based on 90% to ensure equitable treatment; the 90% level seldom triggered payments for slaughter cattle, even though there were unprofitable years.

After several years of deliberation between provinces and the Federal government, it appears that a program may be developed for the red meat sector. Alberta and Ontario, and to a lesser extent Saskatchewan and Manitoba, have agreed in principle with the Federal government on a three way (Provincial and Federal governments and producers) cost sharing plan; Quebec and B.C. have not agreed to the Plan.

With the exception of periodic programs in Alberta and Ontario, all provinces from B.C. to Quebec have legislated programs to address income stability (or income levels) in the beef industry. Ontario provided payments of $40/head on slaughter cattle and $20/head on backgrounded cattle weighing up to 600 pounds which were marketed in 1980. In Alberta support payments of $4/cwt. for A,B and C grade slaughter cattle and $50/head for backgrounded cattle were made for animals marketed during the year ending November 30, 1981. Although most of the legislated programs are based on production cost and returns relationships, the level of stabilization varies greatly among programs. Most provinces (Quebec, Manitoba, Saskatchewan and British Columbia) appear to exceed the requirements for income stabilization and provide a measure of income

subsidization. As a result, provincial stabilization programs are to some extent directed toward industry growth and development. The impact of the various provincial programs on regional beef industry supply response is not certain since decision making criteria and programs vary greatly between provinces. Programs in British Columbia, Saskatchewan, and Manitoba provide a guarantee in excess of the cash cost of production which could generate a positive supply response depending on producer confidence in the longevity of the programs.

The Saskatchewan Beef Stabilization Act (1981) was restricted to cow-calf producers with payments based on cow-calf to finish. A 1982 amendment extended the Act to include a feeder-finishing program. Both plans provide for all cash costs plus 55 percent of non cash costs based on the estimated average cost of production in the Province. The Manitoba program offers guaranteed prices based on anticipated price trends in the future. The Manitoba guarantee for finished cattle would be within the range of the two Saskatchewan plans, and is restricted to cow-calf to finishing. Quebec's program for feeder calves, stockers and slaughter cattle gaurantees the cost of production plus 90% of the salary of a specialized industrial worker.

Provincial finished cattle programs to some extent compete for a fixed supply of feeder cattle. In the case of the cow-calf sector, other factors such as resource availability (primarily range and forage) and production alternatives are important determinants of the level of production. Future growth based on existing programs is also dependent on the ability of provinces to continue injecting large sums of money into the industry. The

generosity of provincial programs is cause for concern over possible trade retaliations from the U.S. which could restrict feeder and slaughter cattle exports to the United States.

Marketings of A, B, and C grade cattle for 1978 through July 1983 are outlined in Table B-15 as an indicator of feedlot volumes. Comparison of 1982 to 1978 volumes shows Alberta down 4%, Ontario down 10%, and Manitoba down 22%; while increases were recorded in B.C. (36%), Saskatchewan (12.7%), and Quebec (23%). Quebec and B.C. showed steady growth over the 1978-82 period; however, B.C. volumes in 1983 appear to be lagging 1982. The growth rate in Quebec was enhanced by their stabilization program, but also by a combination of loan incentives and capital grants for construction of facilities. Saskatchewan's increase all occurred in 1982 which paralleled initiation of the feedlot stabilization program.

TABLE B-15 SLAUGHTER CATTLE MARKETINGS BY PROVINCE OF ORIGIN
A, B, AND C GRADES
(1978 - 1982)

	B.C.	ALTA	SASK.	MAN.	ONT.	QUE.
1978	47026	1179924	233637	253873	885646	18754
1979	38213	1109756	187951	210529	803942	22018
1980	47685	1079020	192619	200200	817295	36741
1981	56172	1132106	188619	199345	792634	51067
1982	64182	1130911	263516	197038	793827	62547

SOURCE: Agriculture Canada Livestock Market Review, and Livestock and Meat trade report.

C. LOCAL AND REGIONAL WHOLESALE PRICES

Canada and the U.S. share comparable trade policies regarding the importation of live cattle and beef. The General Agreement on Trade and Tariffs (GATT) negotiations finalized in the late 1970's resulted in a reduced and more equitable Canada - U.S. tariff situation. The current tariff for feeder and slaughter cattle is one cent/lb. in both countries, while the tariff for beef is two cents/lb. Both countries have global import quotas for beef. The U.S. Meat Import Law has a trigger level of 1.18 billion pounds. After reaching the trigger level, quotas may be recinded, quotas may be imposed, or countries may agree to voluntary restraint. Voluntary restraint has been the chosen alternative in recent years, as the Meat Import Law provides a 10% volume bonus under voluntary restraint. Under voluntary restraint, Canadian beef exports to the U.S. were limited to 121.8 million lbs. in 1982 and 131 million pounds (filled by November) in 1983. The Canadian Meat Import Act permitted over 142 million pounds of beef to be imported in 1983. The U.S. was allocated 23 million pounds which was filled by November.

In general, slaughter cattle move with minimal problems between Canada and the U.S. The quota limits for beef imports in both countries restrict respective trade opportunities and have a tendency to disrupt two-way trade in the last quarter of the year. As a result of the Canada - U.S. two-way trade, Canadian cattle prices are derived under the umbrella of the U.S. market which effectively establishes a Canadian "ceiling price" and a "floor price" for cattle. The most typical situation is the "price ceiling" when Canadian (Toronto) slaughter cattle prices reach a premium

over the U.S. that is high enough to offset freight, tariff and brokerage costs for cattle imported from the U.S. Most slaughter cattle imports are brought into the Toronto market with Winnipeg ranking second, reflecting the proximity of these two markets to U.S. slaughter cattle.

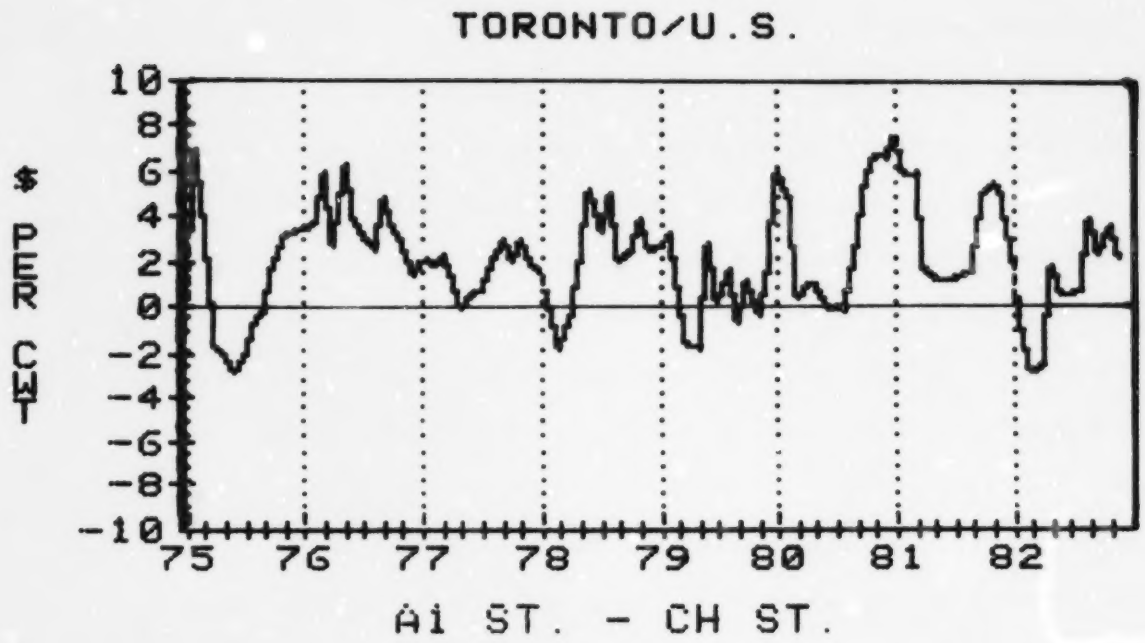
The cost to land Omaha cattle into Toronto is approximately $6/cwt., while the cost of importing cattle from Michigan is around $3.00. This would indicate a theoretical price ceiling of $3/cwt. (Toronto over the U.S.). It is clear that slaughter cattle imports hold Toronto prices, and Canadian prices, in line with the U.S. (Figure C-1). As the monthly average Toronto price rises to a "ceiling" level, slaughter cattle are imported into Ontario. Price differentials for 1973 and 1974 were not included as the pricing and trade situation was influenced by U.S. price controls in 1973 and by the Diethylstilbestrol (DES) certification program in Canada in 1974.

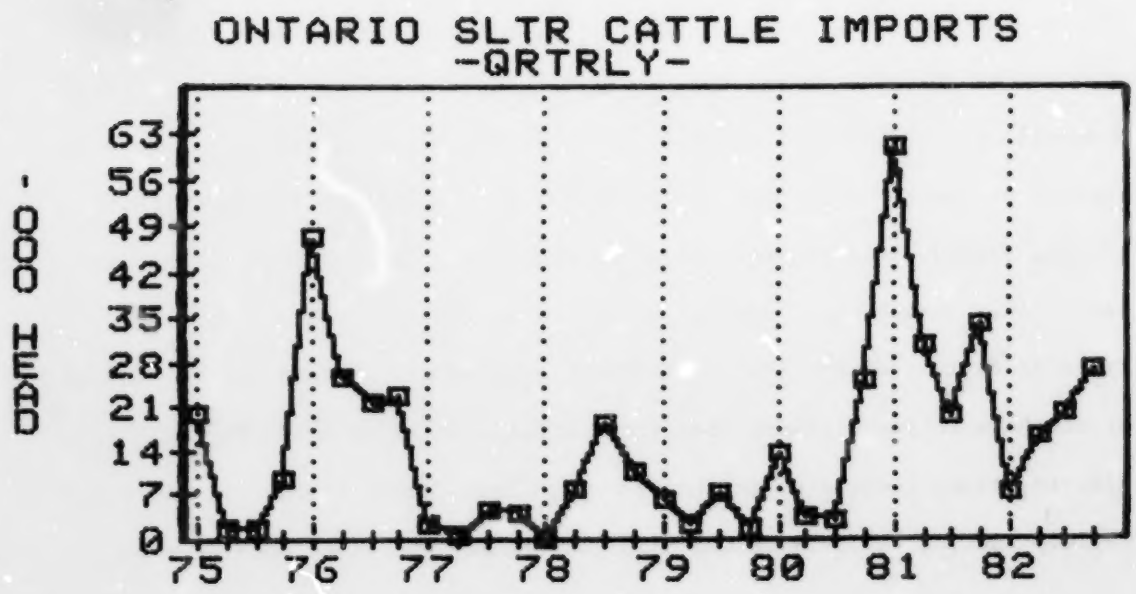
While Toronto and U.S. price relationships and trade for live cattle indicate arbitrage between the markets; such is not the case for beef. Canadian and U.S. beef import quotas limit beef trade, and trade volumes generally consist of boneless beef rather than quality carcass or boxed beef. This limit on beef trade probably results from the quotas as well as differences in grading and product preparation.

1. WHOLESALE PRICE RELATIONSHIPS

Interregional flows of cattle appear to have resulted in arbitrage maintaining market price differences in line with transfer costs for

FIGURE C-1

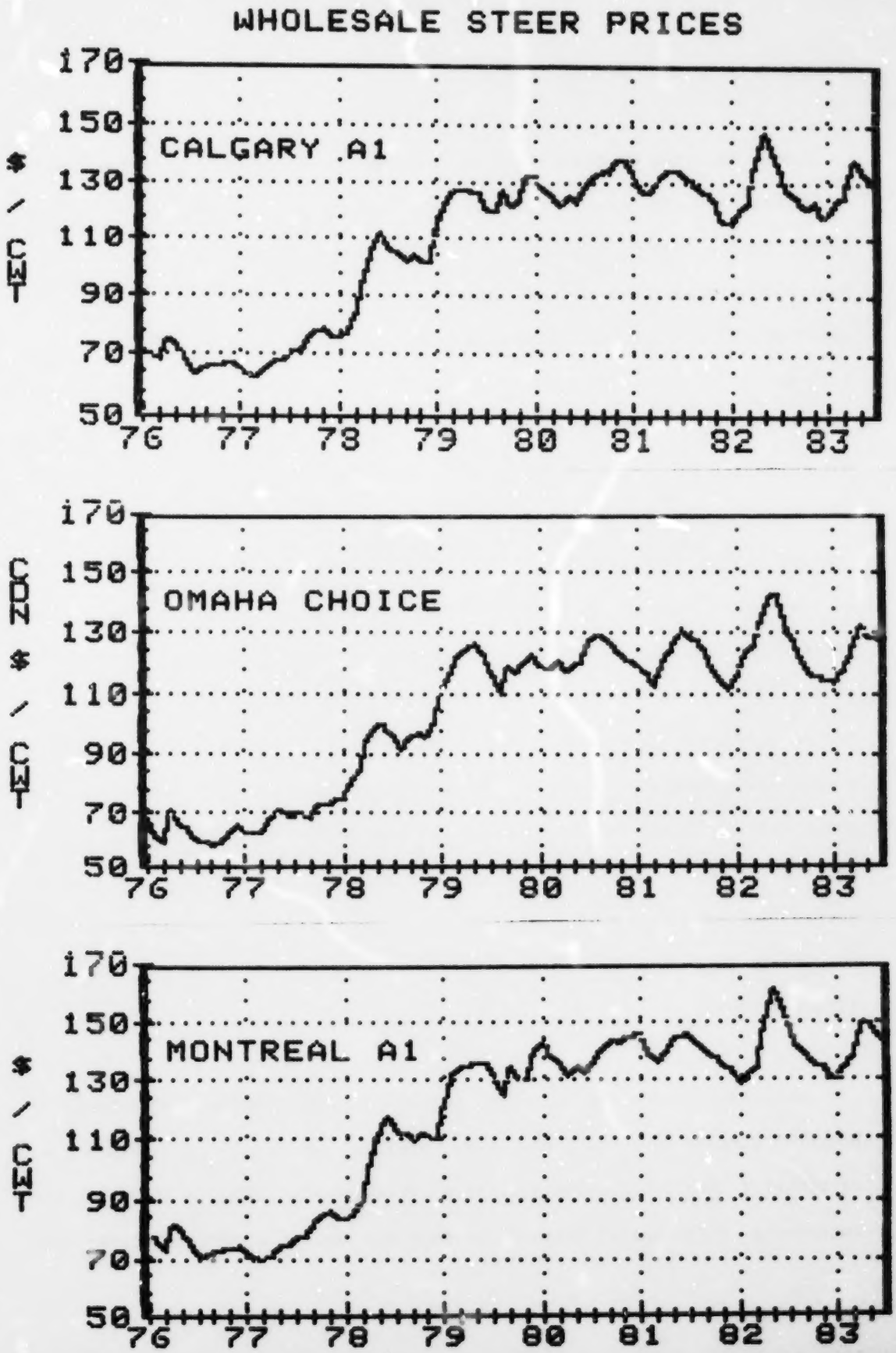

TORONTO/U.S.
10
8
6
4
2
0
-2
-4
-6
-8
-10
75
76
77
78
79
80
81
82
Ai ST. - CH ST.


ONTARIO SLTR CATTLE IMPORTS
-QRTRLY-
63
56
49
42
35
28
21
14
7
0
75
76
77
78
79
80
81
82

slaughter cattle. However, wholesale prices in Eastern Canada have increased relative to those of the U.S. by more than the increase in transfer costs suggesting a lack of arbitrage between the Toronto and Omaha markets. Although beef may move relatively freely between Eastern Canada and the U.S., most trade is limited to lower quality beef as a result of differences in grading systems, quota restrictions, buyer specifications, trade practices, market information, and possibly other institutional factors. Eastern Canadian wholesale prices appear to have increased in response to the increase in transfer costs between Western and Eastern Canada. At the same time Alberta wholesale prices have remained stable relative to the Omaha market. As a result, wholesale beef prices in Eastern Canada have increased relative to the Alberta and U.S. markets by the amount of the increase in the red meat freight rate, while slaughter cattle prices in Western Canada have declined relative to the Toronto and U.S. markets.

Although Eastern wholesale prices have trended upward relative to Alberta and the U.S., there is still a close relationship between wholesale beef prices recorded on the Calgary market and those reported for either Montreal ($r = .997$) or Omaha ($r = .985$). With the exception of the U.S. attempt at price controls (late 1973) and Canadian DES certification program (1974), interregional flows of cattle and limited beef trade have essentially maintained stable price relationships except for changing transfer costs. Since 1976, wholesale prices in Canada and the United States have followed almost identical patterns of adjustment (Figure C-2). Alberta prices fluctuated in the $70 to $80/cwt. range (1976-77), increased rapidly during 1978-79 to the $120/cwt. range, and since then have mostly

FIGURE C-2

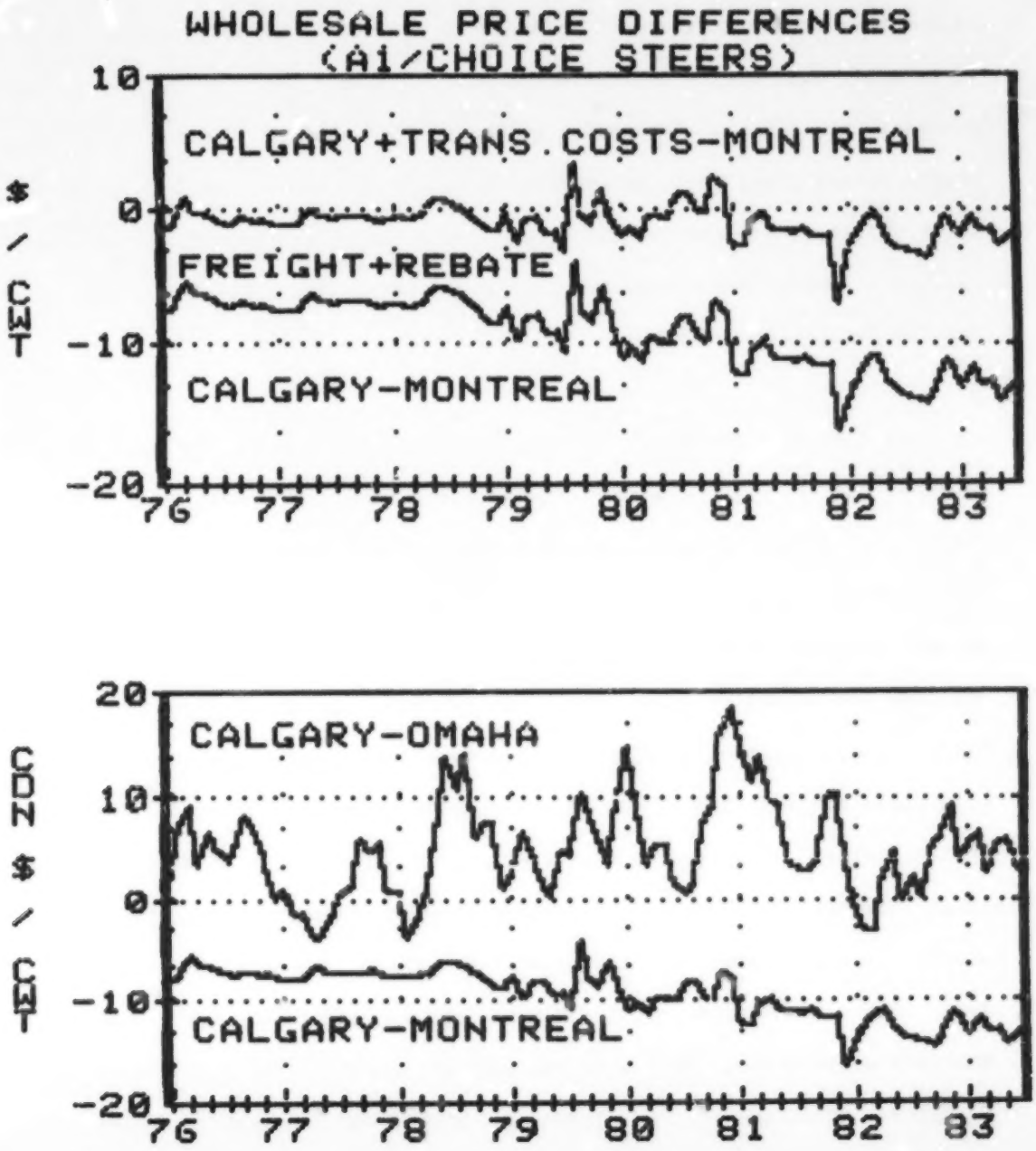

WHOLESALE STEER PRICES
CALGARY A1
OMAHA CHOICE
MONTREAL A1
$ / CWT
$ / CWT
$ / CWT
170
150
130
110
90
70
50
76
77
78
79
80
81
82
83

varied between $120 and $135/cwt.

Over the 1976-83 (June) period Calgary wholesale beef prices averaged $9.34/cwt. below Montreal (range $4.00 to $16.00) and $5.05/cwt. above Omaha Choice beef (range of $3.75 below to $18.10 above). The Calgary - Montreal price difference was relatively stable at $5.40 to $7.50/cwt. until mid-1978 after which Montreal prices increased relative to those of Alberta as a result of rapidly increasing freight rates on beef shipments to Montreal. The Alberta - Omaha price difference does not appear to have been affected by the trend in freight rates, suggesting that the increase in the Montreal wholesale price, offset the effect of increased transportation cost (Figure C-3). Transfer costs (freight and rebate) account for a large part of the Montreal advantage; however, the price differences continue to exhibit an increasing trend and greater variability since 1979. Although reasons for increased variation in the Alberta - Montreal price difference are not certain, it does appear that relative supply and demand conditions affect price negotiations. For example, the price difference was not adequate to cover transfer costs during the latter half of 1980 — a period of relatively high prices and tight supplies of beef. Conversely, price differences were greatest during periods of relatively large supplies of beef and lower prices such as during most of 1981 and 1982.

Wholesale price differences between the Omaha market and Alberta or Montreal markets have followed very similar patterns, and exhibit more variability than the Alberta - Montreal relationship (Figure C-3). The increasing differential between the Montreal and Omaha markets corresponds

FIGURE C-3

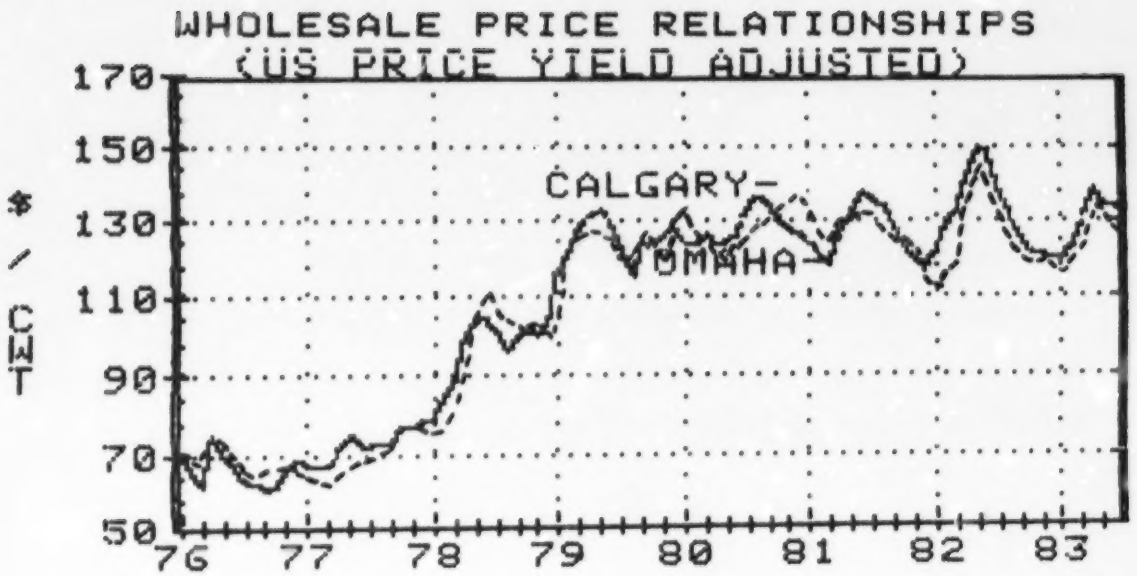

WHOLESALE PRICE DIFFERENCES
(A1/CHOICE STEERS)
CALGARY+TRANS. COSTS-MONTREAL
FREIGHT+REBATE
CALGARY-MONTREAL
$ / CWT
10
0
-10
-20
76
77
78
79
80
81
82
83
CALGARY-OMAHA
CALGARY-MONTREAL
CDN $ / CWT
20
10
0
-10
-20
76
77
78
79
80
81
82
83

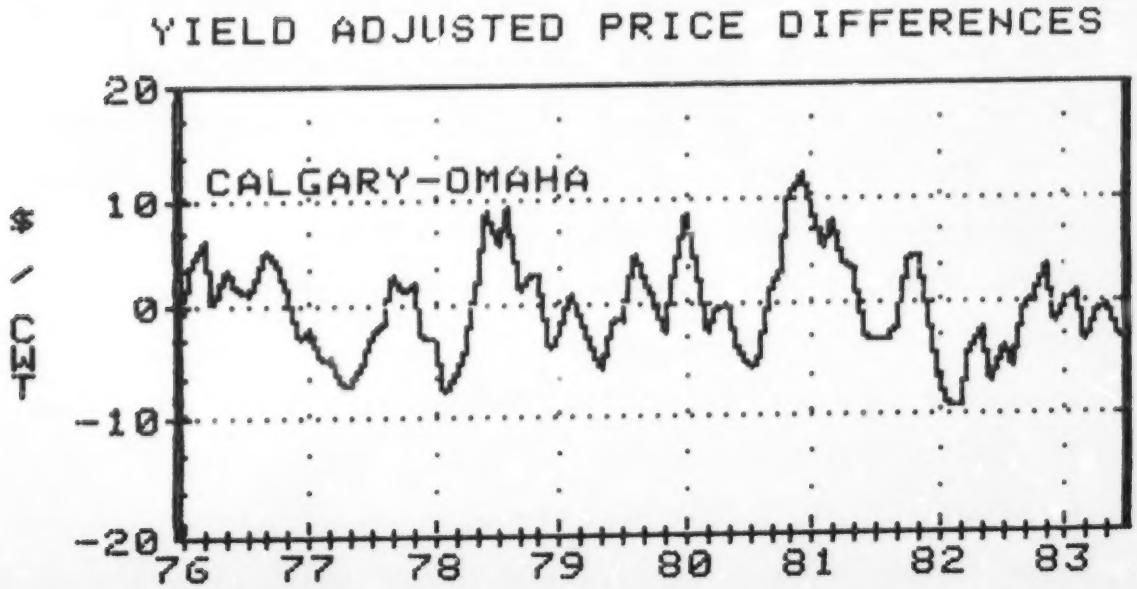
to the trend in Alberta - Montreal price differences suggesting Montreal prices have tended to increase relative to the other markets since 1979. In general, U.S. Choice wholesale prices ($CDN) have been lower than either Montreal or Alberta wholesale prices. Canadian A1,2 carcasses have a higher retail yield than the average U.S. Choice grade (about 5%), but in terms of fat cover and marbling may more closely resemble U.S. Good carcasses which are discounted 5 to 8 percent relative to Choice grade in the U.S. wholesale market.

Based on U.S. wholesale prices adjusted for yield differences (1.05 percent) Calgary A1,2 carcass prices averaged only $.09 above Omaha Choice carcasses (compared to $5.05/cwt. for the reported prices) over the 1976 to 1983 (June) period. Figure C-4 clearly demonstrates a close relationship between the two wholesale markets, and periods of positive as well as negative price differences over the 1976-83 period. Negative price differences, as shown in Figure 3, indicate periods of higher U.S. prices, on a yield constant basis, and an opportunity to export Alberta beef to the United States. After duty and customs clearance, the cost of shipping beef to the Western U.S. compares favorably with shipments from the Midwest states. Freight rates to California, for example, are about $2.50/cwt. less than to Montreal, or $4.50/cwt. less including the packer rebate to Montreal wholesalers. With duty and customs charges added there is still a $2.25/cwt. advantage to San Francisco and $3.83 to Seattle relative to Montreal.

While it would seem natural that Alberta wholesale prices would eventually decrease (due to the increase in meat freight to Montreal) to

FIGURE C-4


WHOLESALE PRICE RELATIONSHIPS
(US PRICE YIELD ADJUSTED)
$ / CWT
170
150
130
110
90
70
50
CALGARY-
OMAHA
76
77
78
79
80
81
82
83


YIELD ADJUSTED PRICE DIFFERENCES
$ / CWT
20
10
0
-10
-20
CALGARY-OMAHA
76
77
78
79
80
81
82
83

the point of an "export basis" relative to the U.S., this has not occurred. Alberta wholesale prices have maintained a constant relationship to the U.S., while Toronto and Montreal have increased. The main reason cited for this phenomenon is the restricted trade in beef which permits the Toronto-Montreal markets to exceed the theoretical "import ceiling". If two-way trade opportunities were readily available for beef, Eastern Canadian wholesale levels would not gain premiums over the U.S. and Canadian wholesale levels would decline. This situation would quickly push Calgary wholesale levels to an export basis with the U.S.

2. DEMAND AND CONSUMPTION

Consumer demand is a major determinant of market prices and future supplies for beef, as well as other meat and poultry products. Although short term beef supplies (up to 2 years) determine beef consumption rates, consumer demand determines the price level necessary to utilize the supply. In the longer term, consumer willingness to purchase beef has a significant impact on production decisions and, therefore, future consumption levels. Several studies (eg. Yeh, Holmes, Yankowsky, Kulshreshtha and Wilson, Tryfos and Tryphonopoulos, and others) have shown the demand for beef in Canada to be moderately responsive to changes in beef prices (elasticities of -.465 to -.801) and moderately to highly responsive to income changes (elasticities of .393 to 1.044) over various periods between 1947 and 1976. In recent years, however, there is evidence to suggest demand may have either "tapered off" from the growth rates of the 1960's and early 1970's, or become more sensitive to price changes and less responsive to income growth.

Throughout the post World War II years, and until 1976, per capita beef consumption in Canada followed an upward trend in response to income growth and favorable price relationships for beef. Although real incomes continued to increase until 1982, prices were not adequate to sustain the 1975 level of production resulting in an industry cut-back during 1976, through 1979, and declining consumption rates through 1980 (Table C-1). Since 1980, consumption appears to have stabilized at about 88 to 90 pounds per capita, and retail prices have not been sufficient to generate the increased slaughter cattle prices necessary for a positive supply response by the producing sector. At least part of the current consumption rates have been maintained based on a relatively high level of heifer and cow slaughter. Future beef supplies and, therefore, consumption rates will decline with any significant increase in the breeding herd. It is also apparent that supplies cannot be expected to increase before 1986 as a result of reduced cow slaughter, or before 1988 based on increased heifer retention.

The availability and price of substitute products, particularly pork and chicken, are important factors affecting the demand for beef. During the 1971-82 period pork supplies essentially ran counter-cyclical to beef supplies, while chicken supplies increased and decreased within each phase of the beef cycle. As a result, with the exception of the record high beef supplies during 1976-77, total meat and poultry consumption was relatively stable at about 208 to 214 pounds per capita over the 12 year period. It should be noted that per capita consumption estimates are based on carcass equivalent weights for livestock and eviscerated weights for poultry.

Therefore, these estimates represent a gross over-statement of the true volume of meat consumed.

Beef's share of the total meat and poultry consumption has varied with the trends in production reaching a peak of 51 percent during the 1976 industry cut-back, then declining to 40 percent in 1980 before increasing to 43 percent in 1982 (Appendix 9). The recent increase in share has been in response to the decline in pork supplies, since both chicken and beef supplies have been relatively stable for the past 3 years. Chicken consumption accounted for an increasing share over the 1976 to 1979 period, as supplies increased from about 32 to 39 pounds per capita, but has since stabilized at 37.5 to 38 pounds representing 17 to 18 percent of the total meat and poultry consumption.

TABLE C-1 BEEF INDUSTRY PRICES AND CONSUMPTION RELATIONSHIPS

	PRODUCER PRICE 1) ($/cwt)	RETAIL PRICE 2) ($/LB)	PER CAPITA CONSUMPTION(LBS) 3) BEEF	MEAT	POULTRY	TOTAL
1971	32.35	.91	88.5	165.8	42.9	208.7
72	35.10	.99	94.6	170.2	43.8	214.0
73	44.90	1.20	92.7	162.9	45.4	208.3
74	48.17	1.32	96.1	167.9	44.2	212.1
75	43.87	1.26	106.4	171.4	41.4	212.8
76	38.94	1.18	113.2	179.5	44.1	223.6
77	40.61	1.25	107.9	173.6	45.6	219.2
78	58.36	1.83	100.9	167.0	47.2	214.2
79	76.02	2.40	88.2	160.9	50.5	211.4
80	75.63	2.61	87.6	167.9	50.0	217.9
81	74.16	2.68	90.3	165.2	49.6	214.8
1982	73.04	2.66	89.1	158.8	50.0	208.8

1) Calgary Choice/A1,2 steers - Agr. Can. Livestock Market Reviews.
2) Average retail price for sirloin, round, prime rib, blade roast(blade out/in), stewing beef, and hamburger for 26 cities in Canada during April and August 1982 indexed by CPI for beef - Stats. Can. Cat. No. 62-010, consumer prices and price indexes.
3) Stats. Can. Cat. No.s 23-202 and 23-203, Production of poultry and eggs, and Livestock and Animal product Statistics.

Retail price indexes for beef, pork and chicken appear to reflect the variations in relative and total supplies of meat and poultry products, as well as trends in economic growth. Beef prices increased 192.1 percent over the 1971-82 period while pork and chicken prices increased 217.5 and 219.4 percent respectively in comparison to a 162.5 percent increase in the CPI for all items (Appendix 9). That is, during 1982 the average real retail prices for beef, pork and chicken were about 11.3, 21.0 and 21.7 percent respectively higher than they were during 1971. Over this same period disposable incomes increased by 291 percent to $10,777 per capita, or 43 percent in terms of 1971 dollars.

The increase in real disposable incomes relative to retail prices, with relatively stable consumption rates, indicates that the share of consumers' disposable income spent for meat and poultry products has declined since 1971. A lack of information concerning retail prices prevents any accurate assessment of consumer expenditures on meat and poultry products. Based on Statistics Canada estimated average retail prices for selected cuts in 26 cities during 1982 (April and October) and price indexes for meat and poultry products, total expenditures on beef, pork and chicken more than tripled over the 1971-82 period (Table C-2). It also appears that per capita expenditures for beef continue to be greater than expenditures for pork and chicken combined; but beef's share has declined from 56 to 54 percent, while chicken has increased from 9 to 12 percent of the total expenditures. Considerable caution should, however, be exercised in making such assessments since the selected cuts used in determining beef and pork prices may not reflect actual values on a carcass

equivalent basis. Although the estimates are consistent and provide a reasonable measure of trends, they most likely overstate prices and expenditures, particularly for pork which includes processed bacon among the selected cuts.

TABLE C-2 ESTIMATED EXPENDITURES ON MEAT AND POULTRY PRODUCTS

	ESTIMATED PRICES			ESTIMATED EXPENDITURES			PROPORTION OF INCOME		
	BEEF	PORK	CHICKEN	BEEF	PORK	CHICKEN	BEEF	PORK	CHICKEN
	(DOLLARS PER POUND)			(DOLLARS/CAPITA)			(PERCENT)		
1971	0.91	0.77	0.45	80.54	50.28	13.10	2.92	1.82	0.47
1972	0.99	0.93	0.52	93.65	58.68	15.96	3.06	1.92	0.52
1973	1.20	1.18	0.68	111.24	69.97	21.90	3.09	1.94	0.61
1974	1.32	1.20	0.77	126.85	74.40	23.64	3.06	1.79	0.57
1975	1.26	1.54	0.84	134.06	81.93	24.53	2.81	1.72	0.51
1976	1.18	1.60	0.84	133.58	88.48	27.05	2.44	1.62	0.49
1977	1.25	1.57	0.85	134.88	87.14	28.65	2.26	1.46	0.48
1978	1.83	1.81	0.99	184.65	104.44	34.95	2.77	1.57	0.52
1979	2.40	1.84	1.09	211.68	120.52	42.51	2.84	1.62	0.57
1980	2.61	1.83	1.17	228.64	130.30	44.34	2.73	1.56	0.53
1981	2.68	2.10	1.39	242.00	140.28	52.13	2.51	1.45	0.54
1982	2.66	2.45	1.43	237.01	150.68	53.91	2.28	1.45	0.52

Note: Meat prices based on average April and October 1982 prices for selected cuts indexed to 1971 (Stats. Can. Cat. No. 62-010). Beef includes sirlion, round, prime rib, blade (bone-in/out), stewing and hamburger. Pork includes bacon, center chops, butt roast (boneless/Boston).

Based on the estimated prices presented in Table C-2, the proportion of consumers' income spent on beef peaked at about 3.09 percent in 1973 then declined to a low of 2.26 percent in 1977. Price increases during 1978 and 1979 more than offset the trends in consumption and income resulting in the share of income spent on beef increasing to 2.84 percent. A decline in total expenditures during 1982 reduced the proportion of disposable incomes allocated to beef purchases to 2.28 percent. With the exception of 1982, income-expenditure patterns for both pork and poultry

followed the same pattern of adjustment as beef, although the magnitude of changes were considerably less for chicken. With the exception of the 1978-79 increase, the high (low) values were consistent with periods of relatively large (small) increases in consumer disposable incomes. Again, it must be emphasized that the magnitudes of values are dependent upon the prices used to calculate meat and poultry expenditures. The Canadian Cattlemen's Association suggests that consumers spent 1.92 percent of their disposable incomes on beef during 1982 [Cattlemen, Nov. 1983].

During a period of rising incomes and prices for substitute products, the proportion of consumer income spent on beef has declined, while retail prices and consumption of beef have remained stable. This has been a major concern in the cattle industry. Various sources have either suggested or implied that this situation is the result of changing consumer preferences in favor of other products, particularly pork and chicken. The statistical evidence only partially supports this supposition, since expenditures on other meat and poultry products have not kept pace with the growth in disposable incomes. Retail price increases for pork and chicken during the past three years are at least partly due to reduced supplies, and slow to negative growth in real disposable incomes which have generated increased demand for lower priced meat and poultry products. A comparison of retail prices (Table C-2) indicates that beef prices were high relative to those of pork and chicken during the 1979-81 period. Price relationships (ratios) in 1982 were within the range of those experienced during the 1972-74 period.

The demand for meat and poultry products appears to have become less

sensitive to income changes, and possibly more responsive to price relationships. This situation suggests that consumers may be approaching a ceiling on the quantity of these products they are willing to purchase. That is, increased consumption would require either larger increases in incomes or larger decreases in price relationships than was experienced during the growth period for meat and poultry consumption. Should this be the case, then a relatively large increase in pork supplies during 1983 and continuing at least through 1984 could have a serious impact on the retail prices for pork as well as those for beef and chicken.

3. AGGREGATE ECONOMIC TRENDS

Numerous theories and indicators have been used to plot past economic trends; and while they provide an interesting picture of the past, projecting the future is vulnerable to new economic and political overtones. Considering the recession of the past few years, there has been interest in "long wave" theory. In 1926 Professor Kondratieff generated a long wave chart which showed two complete cycles at that time. These cycles were composed of 27 year growth periods, a one year primary recession, a plateau between depressions or recessions of seven years, and 18 years of decline. Continuing his cycles to date the last peak in growth occurred in the early 1970's and therefore, if the wave theory holds true, world economies may now expect 18 years of economic decline.

The predictive value of the long wave theory is at best questionable and some analysts indicate that the Kondratieff theory fell off track as early as the 1930's. Long wave cycles have been influenced by several

factors such as technological advancements, development of multi-national companies, heavy involvement of governments in the economy and the timing of wars. In short, there are too many new macro influences in the economy and too many economic indicators that are running contrary to past recessions to use the wave theory for predictive purposes (eg. wholesale and stock prices are remaining at high levels where in previous recessions or depressions these indicators went through significant down trends).

For purposes of this study, shorter term cyclical factors will be related to meat consumption patterns. The Canadian Composite Leading Index from 1961 to April 1983 provides an indication of the direction of the Canadian economy (Figure C-5). The Composite Index is composed of the following ten economic indicators:

1. Average workweek - Manufacturing (hours).
2. Residential Construction Index (1971=100).
3. United States Composite Leading Index (1967=100).
4. Money Supply (M1)($1971 Millions).
5. New Orders - Durable Products Industries ($1971 Millions).
6. Retail Trade - Furniture and Appliances ($1971 Millions).
7. New Motor Vehicle Sales ($1971 Millions).
8. Shipment to Inventory Ratio (Finished Goods) - Manufacturing.
9. Stock Price Index (TSE300 Excluding Oil and Gas 1975=1000).
10. Percentage Change in Price Per Unit Labor Costs - Manufacturing.

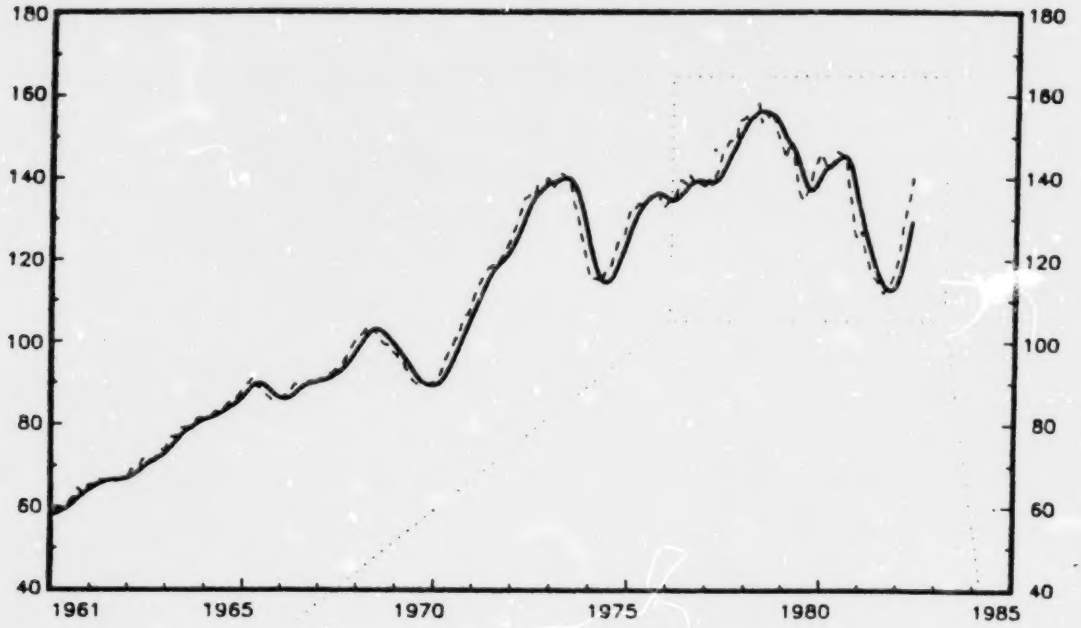
The indicators show that 1983 remained below levels experienced during 1977 through 1980. However, 1983 was a year of recovery following the downward trend that occurred through 1981-82. Forecasts to 1985 published by the Royal Bank of Canada indicate that economic growth will continue at a moderate rate (Table C-3) as indicated by growth in GNP, disposable incomes, business investments etc.

FIGURE C-5

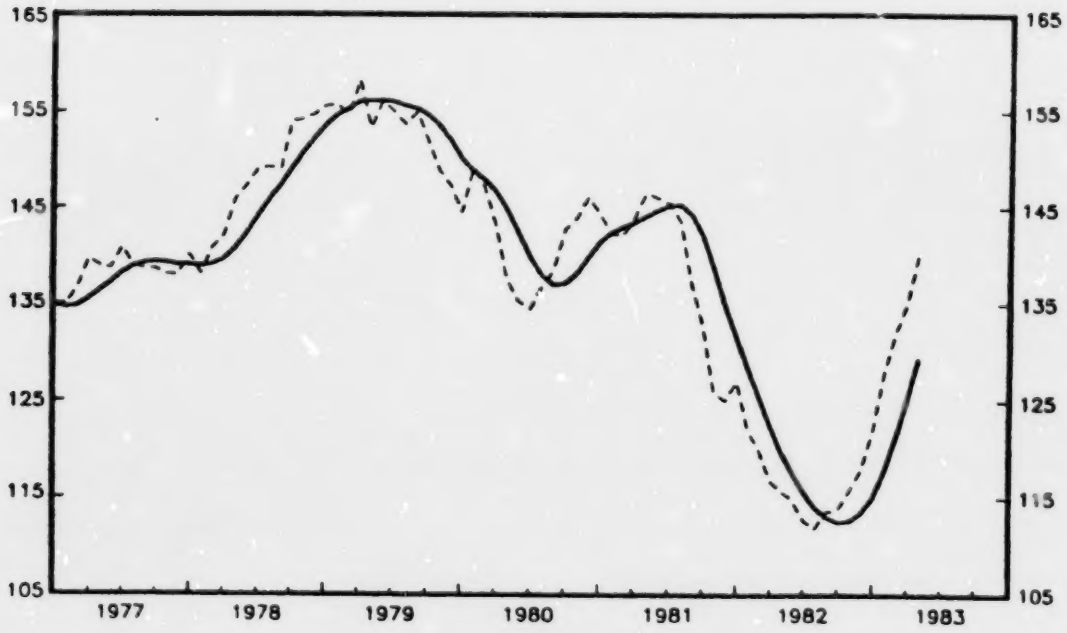
The Canadian Composite Leading Index (1971=100)

Filtered ——— Actual - - - - -

January 1961 to April 1983



January 1977 to April 1983



SOURCE: Current Economic Analysis
Statistics Canada, July 1983

TABLE C-3 ECONOMIC INDICATORS SELECTED FROM THE ROYAL BANK OF CANADA "ECONOSCOPE", OCTOBER 1983

--- % Change ---

	1982 ACTUAL	1983 FORECAST	1984 FORECAST	1985 FORECAST
Economic Growth — GNP *	- 4.4	2.9	4.9	3.0
— Consumption				
-Goods	- 3.7	3.2	5.8	2.9
-Services	.1	3.2	3.5	1.9
— Business Investment	-13.6	-2.1	6.2	6.5
— External Trade	- 1.6	4.2	7.5	5.9
Consumer Price Index	10.8	5.7	5.6	5.8
Disposable Income	9.8	3.6	9.2	7.4
Bank of Canada Lending Rate	13.95	9.4	8.75	9.25

* Adjusted to remove inflation.

D. PROCESSOR VIABILITY

1. SLAUGHTER VOLUMES

Aside from the potential of feeding more out-of-province feeder cattle, Alberta slaughter volumes are based largely on the steer population, and on decisions regarding cow culling and heifer retention v.s. finishing. In past years imports of feeder cattle have largely been offset by shipments out of the province. As a result, slaughter volumes follow a close relationship to the number of steers, heifers and cows sold from the Alberta cow herd.

In 1980 through 1983 Alberta inspected slaughter volumes were maintained through increased female slaughter as steer volumes were stable in 1980-82, with only a moderate increase in 1983 (Figures D-1 and 2). While the level of steer marketings reflects cow herd numbers with a year or two lag, most of the variation in slaughter volumes can be attributed to changes in female slaughter, or in turn to whether the cow herd is expanding or contracting.

Cow and heifer numbers in July cattle surveys were compared to female slaughter volumes for the following 12 months (Table D-1). These comparisons clearly indicated that a female slaughter rate of 30% or higher will result in a herd decrease the following year. Female slaughter in July 78 - June 79, and July 79 - June 80 equalled 29% of the cow and heifer numbers recorded in the July 78 and 79 surveys, and a moderate herd

FIGURE D-1

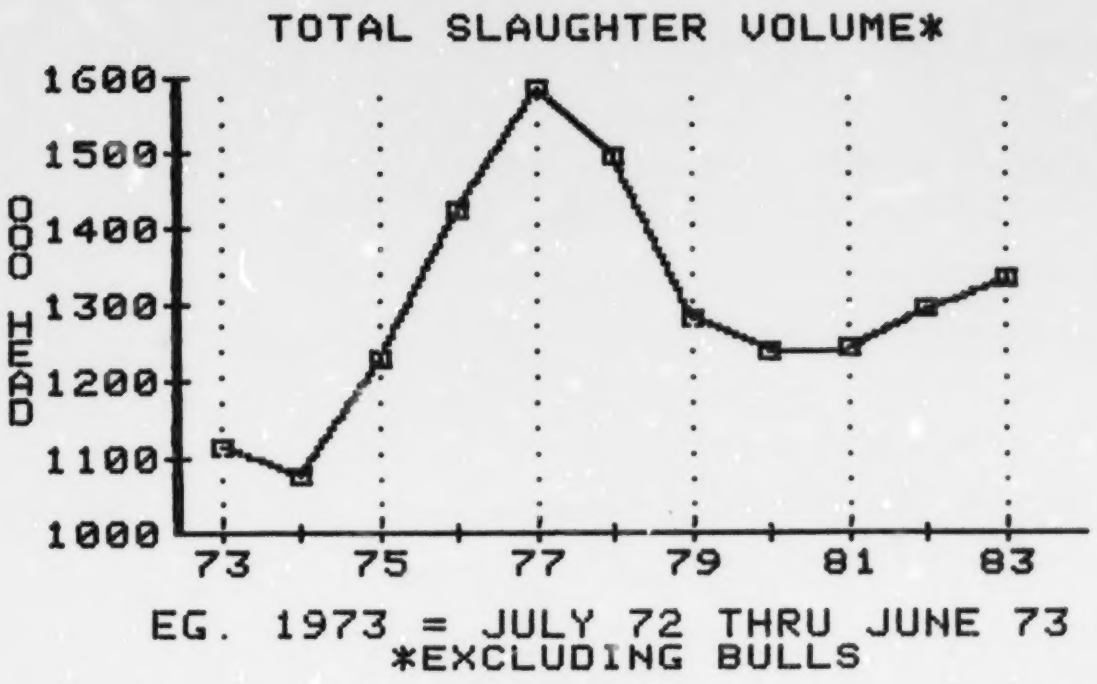
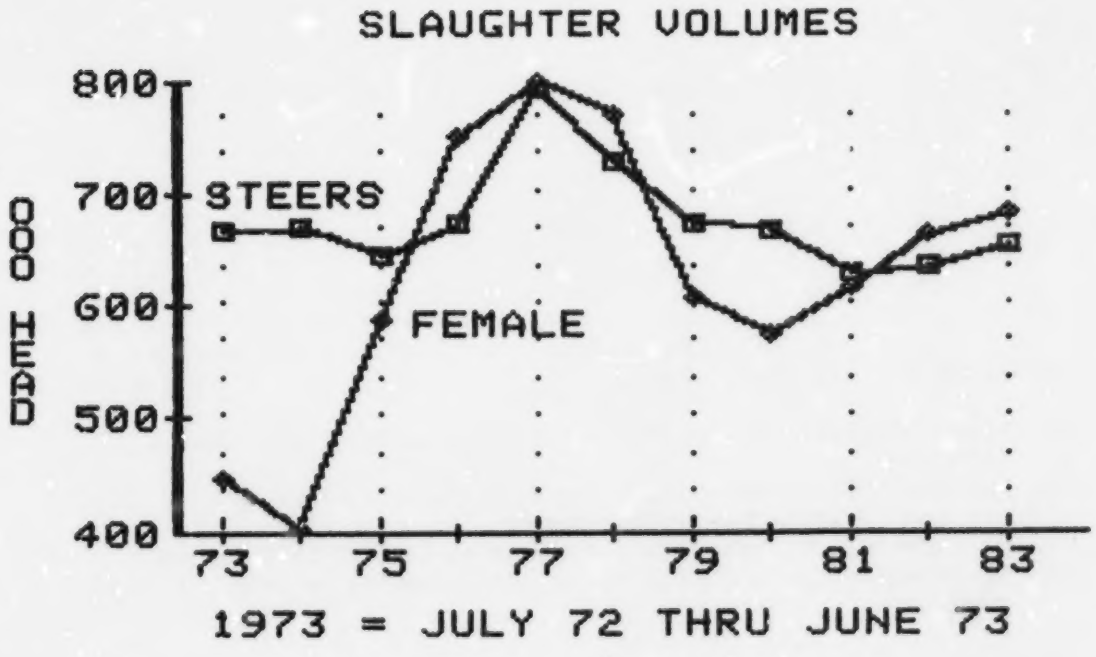


FIGURE D-2



increase occurred in 1979 and 1980. Since then slaughter levels have been 32% and higher, resulting in further reduction of the beef cow herd.

The slaughter volume and in turn the cow herd is based largely on the cow and heifer slaughter rates (Figures D-3 and 4). The cow herd reduction in 1976 through 1978 was paralleled by heifer slaughter rates of 27.4 to 33.6% and cow slaughter at 13.7 to 17.4% (Table D-1). The brief expansion that took place in 1979 and 1980 occurred with a heifer slaughter rate of about 28% in 78/79 and 79/80 and cows at 12%. Heifer and cow slaughter in 82/83 was 35.2% and 14.9% which brought a 3.7% reduction in the breeding herd in the July 1983 survey.

TABLE D-1 SEX OF CATTLE SLAUGHTER

COWS AND HEIFERS					SLTR. AS % OF COW HERD				
July Survey -000 Hd-	% /1 Sltr'd	July Cow Herd	Sltr. Period	% Steers	% Heifers	% Cows	Change In Cow Herd %	Yr.	
1971		1270		/3	/3	/4			/5
72	1864	23.9	1364	72/73	52.5	21.5	12.5	+10.6	73
73	2031	19.8	1509	73/74	49.2	16.7	11.5	+10.0	74
74	2219	26.4	1660	74/75	42.7	23.7	13.7	+ 1.9	75
75	2242	33.5	1692	75/76	40.6	27.4	17.4	- 6.0	76
76	2189	36.5	1590	76/77	46.7	31.5	16.7	- 2.2	77
77	2168	35.5	1555	77/78	45.8	33.6	15.1	- 8.4	78
78	2078	29.2	1425	78/79	43.4	27.8	12.2	+ 1.0	79
79	1960	29.3	1440	79/80	46.7	28.3	11.8	+ 5.2	80
80	1925	32.0	1515	80/81	43.6	30.6	11.5	- 9.3	81
81	1951	34.0	1368	81/82	41.8	31.4	13.7	- 1.3	82
82	1901	36.0	1350	82/83	47.7	35.2	14.9	- 3.7	83
1983	1815	(34.0)/2	1300					- 3.0	84 /2

/1 Female slaughter in the 12 mo. following survey (July-June)
/2 Estimates.
/3 Eg. July 1972 to June 1973 steer or heifer slaughter as % of 1971 cow herd to allow for feeding period.
/4 Eg. July 1972 to June 1973 cow slaughter as % of 1972 cow herd.
/5 Eg. Slaughter in July 1972 to June 1973 results in July 1973 herd change.

FIGURE D-3

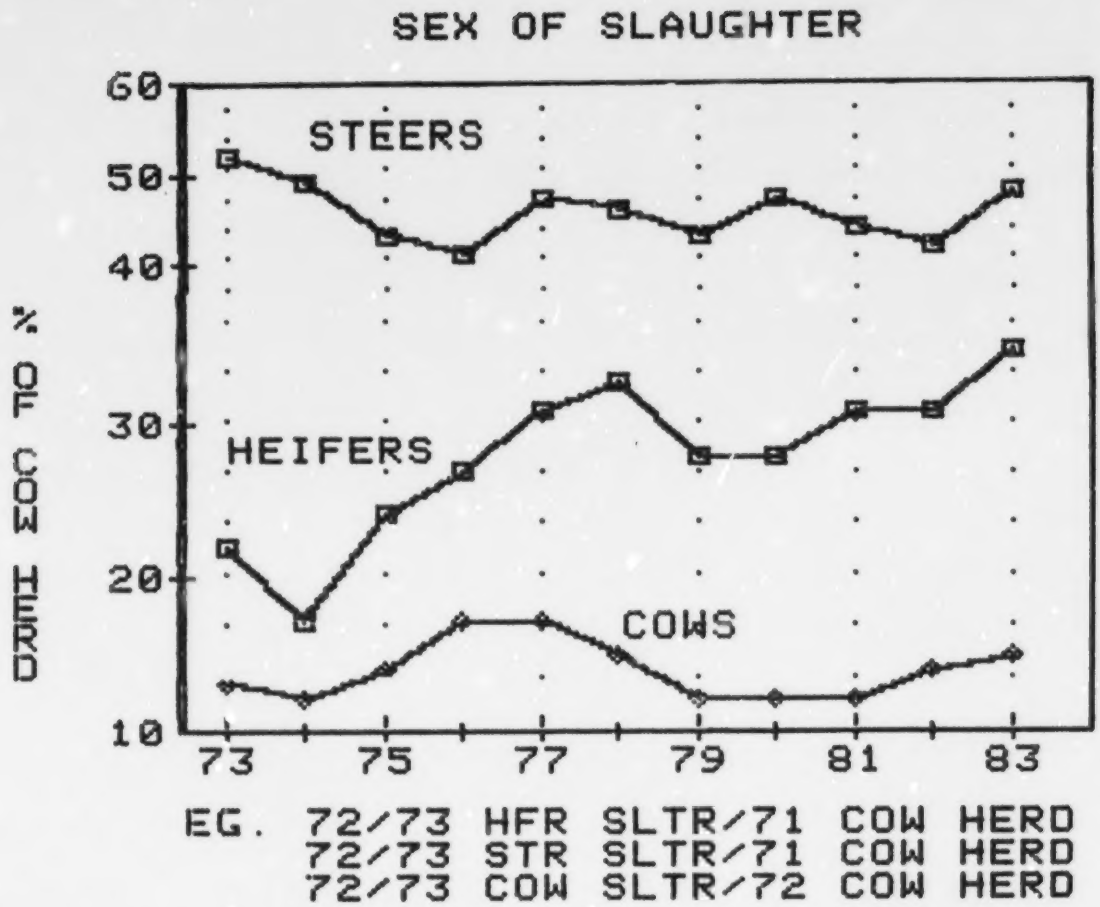
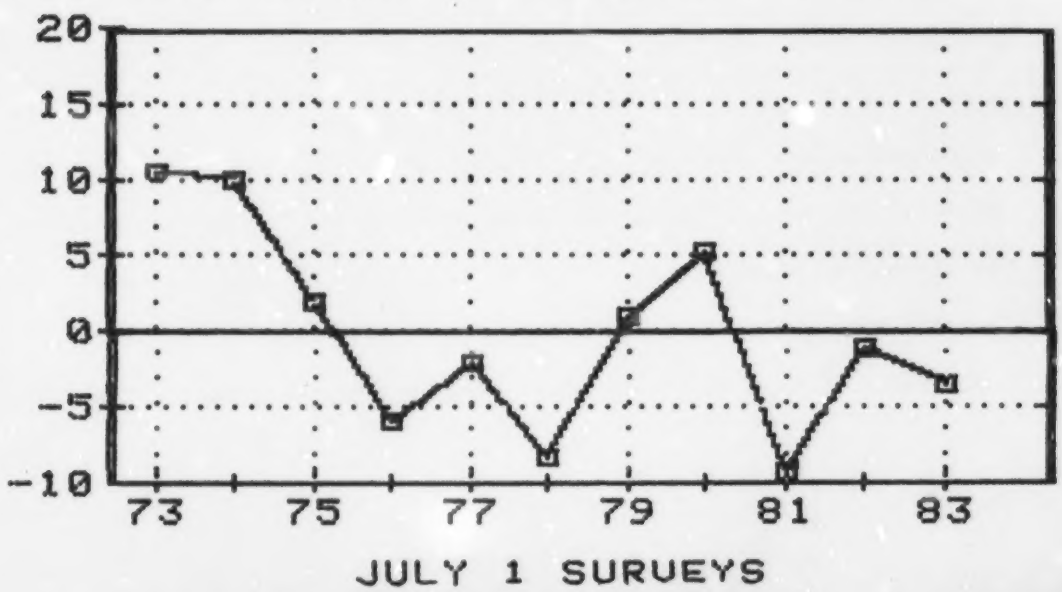


FIGURE D-4



2. VOLUME CAPACITY RATIOS

After 1960 Alberta packing plant capacity underwent two periods of expansion, followed by a reduction phase starting in 1977. In 1960 all slaughter facilities, with the exception of one plant, were multi-species operations. As cattle volumes increased through feedlot expansion, slaughter capacity increased with the addition of beef "kill and ship" plants. Four plants commenced operation in 1960 through 1964 (2 in Lethbridge, 1 at Red Deer and 1 at Medicine Hat), and in 1968 a small multi-species plant opened in Grande Prairie. The next major expansion in beef slaughter capacity occurred during the 1970 - 1974 period with construction of four more beef plants (1 in Lethbridge, 2 in Calgary, and 1 at Brooks). Since 1977 most of the multi-species plants in Edmonton have discontinued operations, as well as smaller plants in Red Deer, Medicine Hat, Grande Prairie, and Calgary.

Rated plant capacity is subject to variation. Plants do have surge capacity as has been demonstrated during unusually high weekly volumes, or in periods when strikes shut down some plants. At best, slaughter capacity estimates represent the volume plants would like to have to provide full employment and use of facilities in the short term. In the longer term adjustments can be made to facilitate larger volumes. One plant flexibility factor which has not been accounted for is the fact that some multi-species plants can adjust utilization of facilities and manpower between hogs and cattle. This factor has most likely resulted in some over-estimation of short-term beef slaughter capacity used in this study.

Looking back to the mid to late 1960's average weekly slaughter in Alberta was 14,000 to 17,000 head per week; while estimated capacity was around 27,000/week, suggesting a utilization rate of 60 to 65%. The plant expansion that took place in the early 1970's brought capacity up to 37,000 head per week by 1974; and with the rationalization that has taken place since then, weekly capacity is presently rated between 32,000 and 33,000 head per week.

Figure D-5 outlines average weekly slaughter for each month and estimated weekly capacity for 1972 through September 1983. Volumes have reflected three phases of the cattle cycle. In 1972 through 1975 volumes were low reflecting lower female slaughter as the breeding herd was undergoing expansion. The higher volumes of 1976 through 1978 reflected the herd reduction that was taking place, while volumes for 1979 to date have reflected a period of lower female marketings (Female marketings have remained high enough to continue herd reduction). Since 1977 slaughter capacity has decreased along with the decline in slaughter volumes.

The high, low and annual average monthly slaughter capacity ratios for 1970 through September 1983 are outlined in Figure D-6. These ratios are based on the average weekly slaughter volume for each month compared to estimated weekly slaughter capacity. Annual average capacity utilization improved from the 60% to 65% range in 1970-74, up to 86% in 1977 when slaughter volumes peaked. With the reduction in capacity that took place during 1978 and 1979 and more stable slaughter volumes, annual utilization rates have been around 83% since 1980. On a monthly basis, utilization

FIGURE D-5

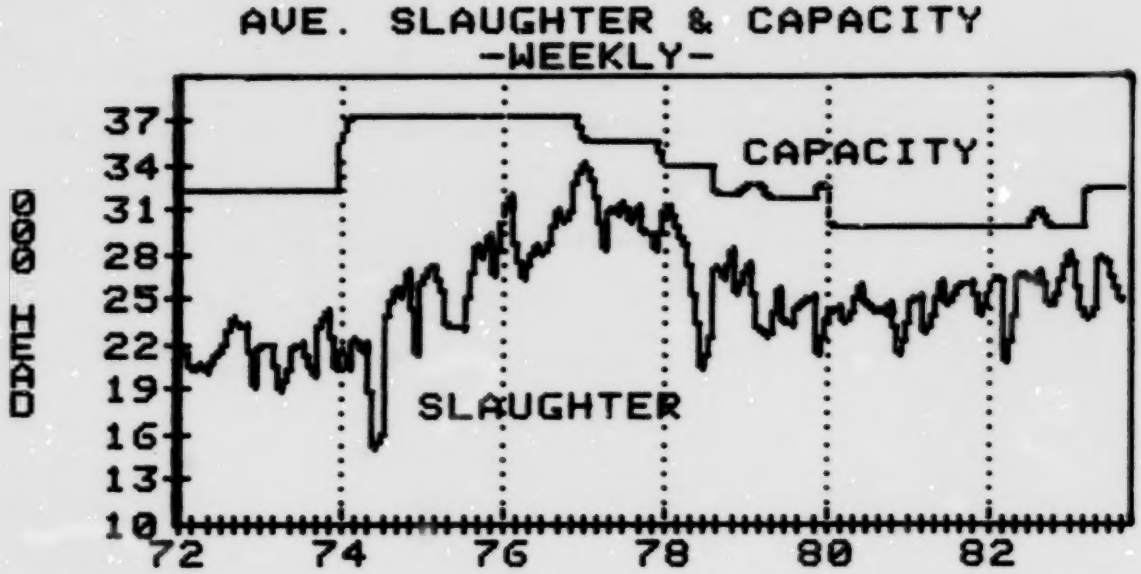
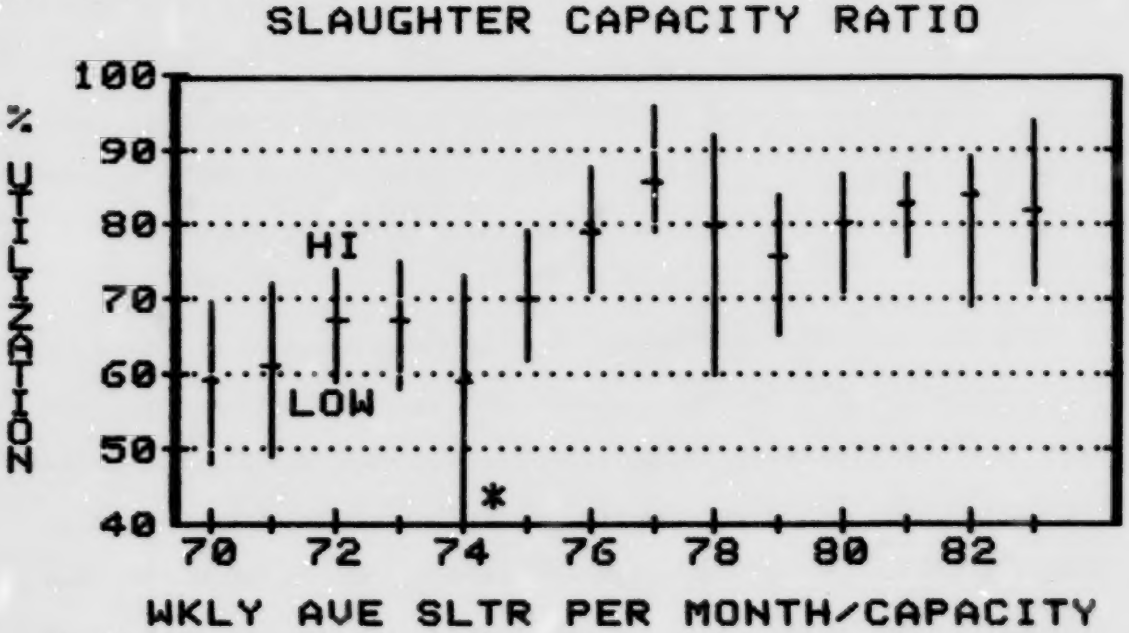


FIGURE D-6



rates have ranged from 69% to 94% in the 1981-83 period (Appendix 10).

While the utilization of capacity in the 1980's appears to have improved over that experienced during the 1970's, it can be expected that a current average utilization rate of 83% will result in much higher per unit costs than would have been the case in the 1970's.

3. PROCESSOR GROSS MARGINS

The packer gross margin, or difference between the cost of slaughter cattle purchases and the revenues received from carcass beef and by-products, is the revenue available to cover costs and profits from the processing operation. The magnitude of gross margins depends on both input (slaughter cattle) and output (beef and by-product) prices, as well as slaughter cattle weights and dressing percentages. As a result margins can be expected to vary with the type and quality of cattle, processing specifications, and market conditions for slaughter animals, beef and by-products. For the purpose of this research, regional packer margins were estimated for the 1976-83 (June) period based on 1140 pound A1-2/choice steers, 650 pound carcass weight (695 lbs. in the U.S.), and monthly average slaughter and wholesale prices. The higher carcass weight for the U.S. reflects an approximate 4 percent higher U.S. dressing percentage (61% v.s. 57%) due to differences in carcass specification.

The estimated packer gross margins presented in Table D-2 overstate actual margins since they are specific to the price spreads and assumed dressing percentages for 1140 pound A1-2/choice steers. The calculations

are based on wholesale carcass value minus the steer cost, and therefore do not reflect the credit value of by-products. While the importance of by-product values is recognized, accurate data was not available. In general, by-product values in Alberta reflect the Eastern market, less freight. The estimated margins also do not account for trends in either the sex of slaughter or average carcass weights over the 1976-83 period. As a result, some caution should be excerised in using the estimated margins for purposes other than as an indicator of trends and regional differences.

TABLE D-2 ESTIMATED ANNUAL PACKER GROSS MARGINS
- Per Head -

	ONTARIO			ALBERTA			U.S.A.		
	Ave.	High	Low	Ave.	High	Low	Ave.	High	Low
1976	- 2.05	10.48	-19.27	- 2.92	7.75	-16.67	- 4.74	9.11	-10.45
77	-13.85	.98	-21.57	-10.17	12.40	-33.03	-12.05	.05	-24.77
78	-32.00	-11.37	-56.13	-31.22	- 3.70	-57.60	-40.56	-15.24	-71.68
79	-62.88	-25.64	-89.82	-59.92	-35.74	-93.95	-78.27	-46.41	-106.70
80	-24.19	- 3.76	-50.03	-18.60	- 4.77	-36.33	-45.65	-30.43	-69.08
81	-19.14	- 5.40	-72.29	-12.21	4.76	-32.25	-37.62	-23.90	-52.22
82	-10.24	9.76	-37.52	- 5.12	21.34	-29.93	-34.46	-19.86	-51.15
(83) (June)	-10.38	- .57	-21.13	7.45	30.90	- 4.33	-39.55	-23.36	-58.66
76-83	-21.84	10.48	-89.82	-16.59	30.90	-93.95	-36.61	9.11	-106.72

: Calculations based on 1140 lb. A1-2/choice steers, and 650 lb. carcass weights (695 in the U.S.) excluding the value of by-products.

: Price differences on by-products due to freight costs would reduce the Alberta averages to approximately the level for Ontario packers.

Regional packer gross margins followed similar patterns of adjustment over the 1976-83 period in response to the trends in slaughter cattle and wholesale prices. Average annual margins (excluding by-product value) were generally negative, and with the exception of a lower U.S. margin in 1983, margins declined from 1976 to 1979 before increasing through the first half

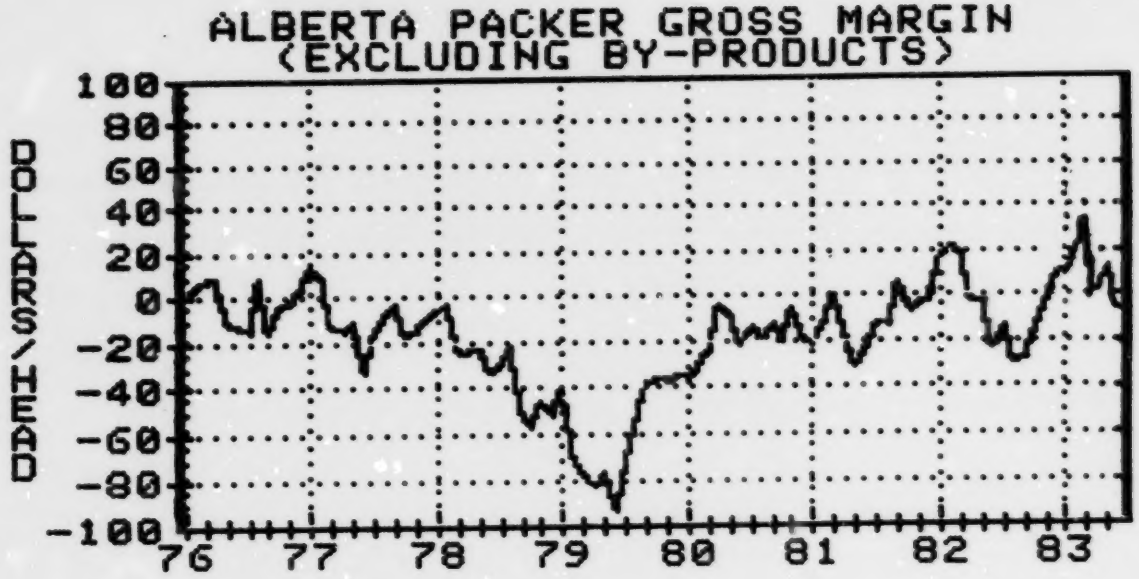
of 1983 (Figure D-7). Margins in Alberta averaged higher (less negative) than those of either Ontario or Midwest U.S. packers, but when lower by-product prices (due to freight costs) are included the Alberta margin likely approaches the level experienced by Ontario packers.

The close relationship between the estimated gross margins for Alberta and Ontario packers indicates that the increase in Eastern Canadian wholesale prices relative to those of the West have been approximately offset by higher slaughter cattle prices in Ontario. That is, exluding the revenues from by-products, Ontario packers do not appear to have gained any advantage over Alberta packers in terms of market price relationships.

4. PROCESSOR RETURNS AND EFFICIENCY

Processing plant costs are the major component of the spread between slaughter cattle and wholesale beef and by-product prices and, therefore, are an important determinant of regional advantages in beef production. Processing efficiency in the Alberta beef industry, as in other regions, has been significantly affected by changes in the number, size, type and location of facilities, as well as by the variations in slaughter volumes experienced during the past decade. Innovations in processing and packaging have essentially transformed most of the industry structure from a few large, centralized, multi-species carcass beef plants to generally smaller specialized carcass and/or "boxed beef" operations. A major purpose of this research was to evaluate factors contributing to beef processing plant efficiency and regional differences in processing costs.

FIGURE D-7


ALBERTA PACKER GROSS MARGIN
(EXCLUDING BY-PRODUCTS)
DOLLARS/HEAD
100
80
60
40
20
0
-20
-40
-60
-80
-100
76
77
78
79
80
81
82
83

An assessment of regional differences in beef slaughter plant costs is complicated by the range of ages, types and sizes of plants; variations in operating levels; differences in labor and capital utilization; degrees of further processing; and other extraneous factors. For the purpose of this analysis, the engineering-economic technique of "cost synthesis" was combined with a computerized algorithum, dBase-II(R), to determine alternative costs of various levels of plant utilization and labor rates for two U.S. plants (90 and 300 head/hour capacity) and one Alberta plant (90 head/hour). All plants were specialized beef operations.

The cost synthesis technique is frequently employed to disaggregate an operation into a series of stages associated with the fabrication, assembly, or disassembly of a product, followed by the determination of appropriate costs for each stage. The procedure overcomes problems of aggregating plant data relating to a range of operating levels or methods of operation, and generates "attainable" as opposed to "average" costs produced by other methods. Cost synthesis also facilitates different combinations of plant and equipment to assess "economies of scale" of different levels of operation, given static assumptions regarding plant equipment and variable cost combinations. The approach does however require precise specification of plant facilities and capacities, as well as resource requirements. The processing plants selected for the purpose of this study are representative of the types and sizes of facilities accounting for most of the Alberta and Mid-West U.S. processing capacities.

Information concerning investment and operating requirements for the specified slaughter plants was obtained based on discussions with industry

sources, particularly packers, and equipment suppliers for both Canada and the United States. The slaughter process was divided into nine stages: corrals, kill floor, chill room, holding room, waste control facilities, office and administration, transportation of raw materials including shipping, unallocated general costs and land costs. A rendering facility was also included in the larger U.S. plant. Costs were allocated by stage of operation according to fixed cost (depreciation, interest, taxes, insurance, and installation) and variable cost (labor, utilities, office, sales, etc.) categories. All costs were calculated on the basis of either 1983 replacement values (buildings and equipment), or current market values (labor and other inputs).

(a) Total Investment and Fixed Costs Requirements

Capital investment requirements for buildings and equipment were developed for each stage of operation in detail based on existing plants and 1983 replacement costs (Table D-3). The allocation of certain investment items to specific stages, and in some cases to buildings or equipment, was to some extent arbitrary due to minor differences in plant layouts, operating procedures, and reporting methods. This was particularly evident in the case of hold, chill, and refrigeration buildings and equipment. As a result, some caution should be excerised in comparing building and equipment costs within stages of the slaughtering process.

TABLE D-3 BEEF SLAUGHTER PLANT INVESTMENT REQUIREMENTS (1983)
(Thousand Dollars)

STAGE	ALBERTA:90 HD/HR		U.S.:90 HD/HR /1		U.S.:300 HD/HR /1	
	BLDGS.	EQUIP.	BLDGS.	EQUIP.	BLDGS.	EQUIP.
Kill Floor	703.7	1645.8	569.2	758.3	1195.2	1764.3
Chill Room	786.6	541.6	683.0	55.8	3733.7	104.1
Holding Room	195.0	5.8	2276.6	184.1	4591.2	308.6
Refrigeration	-	793.5	-	377.1	-	2671.7
Waste Disposal	53.2	327.1	23.3	9.4	75.1	9.4
Administration	277.9	46.8	156.0	49.9	595.7	83.9
Corrals	444.1	23.8	227.1	30.2	784.3	30.2
Transportation	110.0	77.5	170.7	-	225.4	-
Rendering	-	-	-	-	1440.0	3461.7
Total	2570.5	3461.8	4106.0	1465.0	12640.7	8434.0
Investment Per Hd. /2						
Buildings	14.93		23.85		22.03	(19.52)
Equipment	20.11		8.51		14.70	(8.67)
Total	35.04		32.36		36.73	(28.19)

/1 Canadian dollars based on June 1983 average exchange rate.
/2 Investment per head based on 1912.5 hours at capacity utilization; numbers in brackets exclude rendering facility.

Regionally, total investment requirements for beef processing facilities appear to be lower in the United States. Excluding land costs, which vary greatly depending on locations, capital requirements in Alberta were about $2.68 per head capacity higher, than those for similar size plants in the U.S. (90 hd/hr). Although this difference was entirely due to significantly higher equipment costs in Alberta, differences in reporting methods for certain items (eg. piping and wiring) overstates the magnitude of regional differences in equipment and building requirements. The Alberta plant also includes a substantially greater investment in waste disposal equipment, but this difference was more than offset by higher sewage treatment costs in the U.S.

Investment requirements per head capacity (Cdn.$'s) increased in the

largest size of slaughter operation, amounting to about $21 million or $36.73 per head. The increase was, however, associated with the addition of a rendering facility ($1.4 million). Excluding the rendering operation, the equipment requirements per head were only slightly higher than those for the smaller plant, whereas the investment in buildings was about $4.33 per head lower for the larger plant.

Fixed costs were calculated for the eight different stages of the smaller plants and nine stages (including rendering) in the larger U.S. plant. The costs for each category included depreciation (straight line over the life of buildings and equipment), interest (12.5% of average investment), insurance (1.58% of assessed market value), and taxes (1% of assessed market value). In addition, installation costs for equipment items were assessed at 25% of investment costs allocated over a twenty-five year period (ie. 1% per year). The methods used to estimate the fixed cost categories closely approximate actual values experienced by both U.S. and Alberta plants with the exception of insurance which appears to vary with particular situations.

Total building and equipment fixed costs depend on the level of capital employment and assumptions concerning the various fixed cost components. Based on the assumptions outlined for the purpose of this research, about 78 to 80 percent of the total fixed costs accrue to depreciation and interest on the capital investment (Table D-4). Total fixed cost (Cdn.$'s) varied from about $4.50 per head for the 90 head per hour U.S. plant to over $5.40 per head for the Alberta and larger U.S. facilities. Costs were lowest for the 300 head per hour operation when

investments in the rendering facility were excluded from the slaughter process. That is, economies of size are evident in beef slaughter plants, but the magnitude of cost savings (about $.48 per head) is not large, amounting to about 11 percent of the total fixed cost.

TABLE D-4 SUMMARY OF FIXED COST COMPONENTS (1983) /1
(Excluding Land)

FIXED COST	ALBERTA:90 HD/HR		U.S.:90 HD/HR /2		U.S.:300 HD/HR /2	
	TOTAL ('000's)	PER HD	TOTAL ('000's)	PER HD	TOTAL ('000's)	PER HD
Depreciation	350.3	2.04	272.5	1.58	1175.5	2.05
Interest	377.0	2.19	348.2	2.02	1317.2	2.30
Insurance	108.0	.63	88.0	.51	333.0	.58
Taxes	60.3	.35	55.7	.32	210.7	.37
Installation	34.6	.20	14.5	.08	84.3	.15
Total Fixed Cost	930.2	5.41	778.9	4.51	3120.7	5.44
					(2311.9)	(4.03)

/1 Fixed cost per head based on 1912.5 hours at capacity utilization.
/2 Canadian dollars based on June 1983 average exchange rate;
Numbers in brackets exclude rendering facility.

(b) Total Variable Cost Requirements

Variable costs relating to the utilization of labor, utilities, supplies, repairs, sanitation, and other miscellaneous items were estimated for single-shift, capacity rates of plant utilization based on actual plant data and discussions with processors. The allocation of labor and utilities to each of the processing stages was to some extent arbitrary since labor is oftentimes employed in more than one stage of operation, and utility costs reflect the entire operation. Labor rates for the Alberta plant were derived as the average hourly union rate paid during 1983 for an existing plant; whereas, those for U.S. plants reflect the average Teamster, Amalgamated Meat Cutters (AMC), and non-union rates for specific

plant functions. About 70 to 75 percent of U.S. capacity is subject to either Teamsters, or non-union rates which are considerably lower than AMC rates. It should also be recognized that the recent unemployment situation in the U.S. has resulted in either regressive wage settlements, or declared bankruptcies recinding union agreements under sub-section 11 of the U.S. Bankruptcy Act, both of which have reduced labor rates to about the 1979 level. A return to a full employment situation will probably reverse this trend.

Based on single shift capacity rates of utilization, total annual variable costs (Cdn.$'s) declined from $26.80 per head in Alberta to about $22.55 per head for the larger U.S. plant, including rendering and $17.61 per head excluding rendering (Table D-5).

TABLE D-5 SUMMARY OF VARIABLE COST COMPONENTS (1983) /1

VARIABLE COSTS	ALBERTA:90 HD/HR.		U.S.:90 HD/HR.		U.S.:300 HD/HR.	
	TOTAL ('000's)	PER HD	TOTAL ('000's)	PER HD /2	TOTAL ('000's)	PER HD /2
Labor	2601.1	15.11	1917.7	11.14	7159.1	12.48
Foremen	206.7	1.20	78.8	.46	242.3	.42
Gas - Electricity	174.2	1.01	89.9	.52	974.3	1.70
Repairs	277.7	1.61	292.6	1.70	747.0	1.30
Mgt. - Sales	435.3	2.53	536.7	3.12	730.1	1.27
Administration	382.3	2.22	181.6	1.06	666.8	1.16
Transportation	89.0	.52	338.7	1.97	971.8	1.69
Supplies - Misc.	447.0	2.60	512.9	2.98	1447.9	2.52
Total Variable Costs	4613.2	26.80	3948.9	22.94	12939.3	22.55
					(10105.1)	(17.61)

/1 Calculations based on 1912.5 hours at capacity utilization.
/2 Canadian dollars based on June 1983 average exchange rate; Numbers in brackets exclude rendering facility.

Alberta recorded higher variable costs for labor, utilities, and

administrative overhead, whereas, the cost of management, sales, repairs and supplies were higher for similar facilities in the U.S.. The relatively large expenditures for supplies and miscellaneous costs includes such items as leases, licenses, sewer and water, waste disposal, and in the case of the U.S., sewage treatment supplies.

Labor costs are the largest single variable cost item, ranging from $15.11 per head in Alberta to $11.14 (CDN) per head for similar plants in the U.S. operating at capacity. A higher labor cost for the 300 head per hour U.S. plant ($12.48) included about $2.75 per head for the rendering facility. Supervisory personnel (foremen) costs were also significantly less than those for Alberta. In terms of total manpower for 90 head per hour plants, the U.S. facilities required 3 foremen and 100 hourly paid workers compared to 6 foremen and 89 hourly paid workers in Alberta. The higher labor cost in Alberta was, therefore, entirely due to significantly higher wage rates. The average labor rates used in this study were $10.03 (CDN) per hour in the U.S. and $15.28 per hour in Alberta.

Although total and average variable costs per head appear similar for the small and large plants in the U.S., there appears to be significant economies available to the larger firm, particularly in terms of labor, management and sales costs. The higher costs appearing in Table D-5 include the rendering operation which accounts for about 22 percent of the total labor ($2.75 per hd.) utilization. Excluding the rendering requirements, total variable cost for the larger plant are reduced to about $17.61 per head, or $5.33 per head less than those of the smaller plant. As a result, total processing costs (Fixed + Variable) in the United States

are about $5.81 per head lower for the larger plants (Table D-6). Similarily, processing costs in Alberta are about $4.76 higher than those for similar plants (90 hd/hr) in the U.S. It should, however, be emphasized that these size and regional differences in processing costs are based on plants operating at single shift capacity throughout the year (1912.5 hours). Any reduction in either the rate of utilization or hours of operation would have an impact on relative processing efficiencies.

TABLE D-6 SUMMARY OF FIXED AND VARIABLE COSTS
(Per head)

	FIXED COSTS	VARIABLE COSTS	TOTAL COST
Alberta - 90 hd/hr.	5.41	26.80	32.21
U.S. - 90 hd/hr.	4.51	22.94	27.45
U.S. - 300 hd/hr.	4.03	17.61	21.64

Excludes land and rendering requirements.

(c) Hours and Rate of Plant Utilization

The average total cost per head slaughtered in beef packing plants is sensitive to slaughter volumes, as well as the rate of plant utilization (ie. number slaughtered per hour) and the annual hours of operation (1912.5 maximum for single shift). In general, total fixed cost per head declines with increasing volume throughout the feasible range of operation, including two or three shifts. Total variable costs per head also appear to decline with increasing volume, but only within the limits of capacity utilization on a shift basis. Certain variable cost items, such as labor, are constant on an hourly or shift basis, and are therefore sensitive to both the hourly processing rate and the hours of operation. These items result in significantly higher variable costs per head for less than

capacity utilization per shift. Average variable costs decline to capacity utilization on a single shift, then increase with an extention of the hours of operation (partial shift or a second shift) until capacity utilization is attained on two shifts. That is, variable costs are at a minimum for capacity utilization on a single shift, and are higher only for those animals included on the partial second shift. The average variable cost per head is, therefore, the weighted average of variable costs for the two shifts.

Variable costs represent over 80 percent of the total beef processing costs in Alberta. Labor is the single most important cost accounting for about 56 percent of the total variable costs and almost half of the total processing costs. Under most Alberta Union contracts, labor is essentially a fixed cost for a 32 to 39.5 hour week, and is subject to higher rates for extended (overtime) hours of operation. As a result, processing costs for most Alberta plants increase substantially more with reduced slaughter volumes than they do for plants or regions with greater flexibility to adjust the hours of operation to conform with available slaughter volumes.

The cost per head slaughtered in Alberta packing plants has varied considerably from the optimum level shown in Table D-6 due to fluctuations in the industry slaughter-capacity ratio. Processing capacity in the province has generally exceeded the requirements for slaughter volumes on a single shift basis. Since 1980 average annual packing plant utilization rates have been relatively stable at 80 to 83 percent of capacity, while monthly rates have ranged between 69 and 94 percent. Table D-7 illustrates the impact of reduced slaughter volumes on processing costs per head in

terms of adjustments in either processing rates or hours of operation.

TABLE D-7 SLAUGHTER VOLUME AND PROCESSING COST RELATIONSHIPS
(Alberta 90 head/hour Beef Packing Plant)

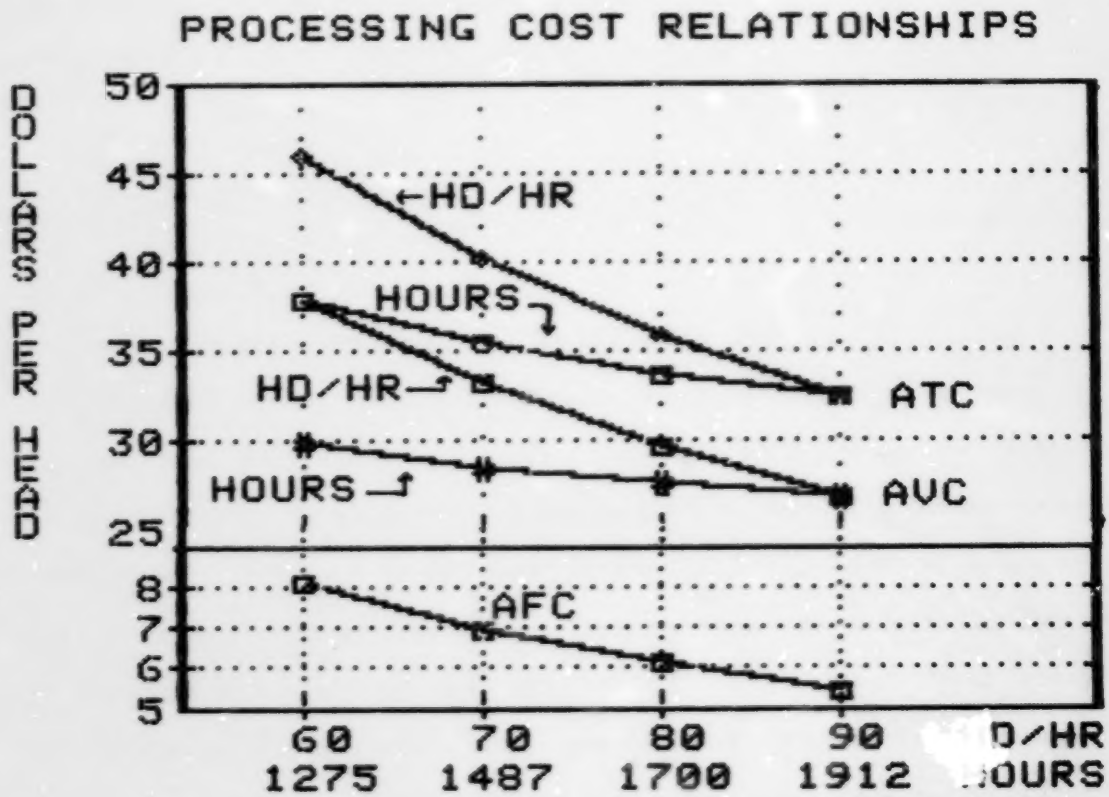
RATE HD/HR	ANNUAL HOURS	HEAD PER DAY	TOTAL HEAD ('000's)	LABOR PER HD	AVC PER HD	AFC /1 PER HD	ATC PER HD
Variable Processing Rate							
60	1912.5	450	114.8	22.67	37.76	8.11	45.87
70	1912.5	525	113.9	19.43	33.06	6.95	40.01
75 /2	1912.5	562	143.4	18.13	31.18	6.49	37.76
80	1912.5	600	153.0	17.00	29.54	6.08	35.62
90	1912.5	675	172.1	15.11	26.80	5.41	32.21
Variable Processing Hours							
90	1275.0	675	114.8	15.11	29.60	8.11	37.71
90	1487.5	675	113.9	15.11	28.40	6.95	35.35
90 /2	1593.75	675	143.4	15.11	27.92	6.49	34.41
90	1700.0	675	153.0	15.11	27.50	6.08	33.58
90	1912.5	675	172.1	15.11	26.80	5.41	32.21

/1 Excluding land.
/2 5 days v.s. 4 days for 143.4 thousand head.

The 1983 Alberta slaughter capacity-ratio of 83 percent was equivalent to about 143.4 thousand head/year or 562 head/day for 90 head/hour processing plants. Packer adjustments to the reduction in slaughter volumes from the 172.1 thousand head required for capacity utilization were limited to either reducing the hours of operation to about 1594 hours (approximately 4 days/week), or reducing the processing rate to about 75 head/hour. Table D-7 clearly indicates an advantage for flexible processing hours. Average processing costs increased from $32.21/head to $34.41 with processing hours reduced to 1594 at 90 head/hour, compared to $37.76/head with the processing rate reduced to 75 head/hour for 1912.5 hours. In the case of flexible hours the labor cost remained constant at $15.11/head, while with adjustments in the processing rate, which

approximates guaranteed labor utilization, labor costs increase to $18.13/head. Figure D-8 illustrates the impact of changes in slaughter volumes on processing costs in terms of adjustments in the rate and hours of operation for slaughter-capacity ratios ranging between 67 and 100 percent.

FIGURE D-8



II. PROSPECTS FOR THE FUTURE

The future structure and viability of the Alberta beef industry will be determined largely by three major factors: Beef Demand, Feedlot Viability, and Processor Viability. These factors are influenced by several variables which may reflect a national or North American situation (eg. beef demand v.s. state of the economy), or they may be of a regional nature (eg. the affect of freight rate changes). The purpose of Part I of the study was to review the Alberta beef industry's position relative to other regions, based on the above factors. The intent of this study section is to outline prospects for the future, based on information derived in the previous section.

A. BEEF DEMAND

Growth in beef production, and in turn slaughter volumes, has been in response to growth in both population and consumer demand for beef. Per capita consumption followed an upward trend throughout the post War II years reaching a peak of 113.2 pounds in 1976, and then declined to about 90 pounds in 1981-83. It is evident that short run (up to 2 years) beef supplies determine consumption rates, and consumer demand determines the price level necessary to utilize the supply. Demand is sensitive to changes in beef prices, real incomes and prices for other meats. The period of increasing consumption for beef (pre 1976) was also a period of sustained economic growth and increasing real incomes, which resulted in herd expansion. The downward trend in consumption during the late 1970's

was the result of consumer reluctance to pay the prices necessary to maintain the peak 1975 level of beef production. The record level of consumption in 1976 was in part due to an inventory reduction in the beef industry.

Meat and poultry prices have not kept pace with the growth in consumer incomes, and with relatively stable consumption rates, the share of consumers' income spent on these products has declined. Per capita expenditures for beef continue to be greater than expenditures for pork and chicken combined; but beef's share has declined by about 2 percent and pork declined 1 percent, while chicken has increased its share of total meat and poultry expenditures by about 3 percent since 1971. It should, however, be recognized that the rate of growth in consumer incomes has declined sharply since the mid-1970's and that real incomes declined in 1983. As a result, there has been some shift to lower priced meat and poultry products. A return to higher rates of economic growth and employment could very well restore beef's share of the total meat and poultry expenditures to previous levels.

The availability, or price of beef substitutes (primarily pork and chicken) is an important determinant of the future demand for beef. During the 1971-82 period pork supplies essentially ran counter-cyclical to those of beef, while chicken supplies increased and decreased within each phase of the beef cycle. As a result, total meat and poultry consumption was relatively stable at 208 to 214 pounds over the 12 year period. Consumers may be approaching a ceiling on the quantity of meat and poultry products they are willing to purchase since demand appears to have become less

sensitive to income changes, and possibly more sensitive to relative prices. Therefore, any future increase in per capita beef consumption may necessitate either a larger decrease in beef prices relative to those of substitute products, or a larger decrease in the supply of substitutes (higher prices) than that which was required during the period of growth in meat and poultry consumption rates.

North American pork production approached record levels in 1983, and a substantial increase in output during the 3rd quarter placed considerable downward pressure on pork prices. The USDA September 1 Hogs and Pigs Report indicated continued high levels of output for at least the first part of 1984. However, depressed prices and a large increase in grain prices have resulted in increased sow slaughter suggesting a reduction in available pork supplies by mid-1984. More recently, a significant increase in U.S. pork prices, possibly due to lower conception rates during the drought of 1983, may delay or reduce the cut-back in farrowing intentions until late 1984 or early 1985. In either case, North American pork production appears to be entering a declining phase which would result in higher pork prices and an opportunity for increased beef production. The record high levels of pork production since 1980 appear to have been a limiting factor on expansion in the beef industry.

Projections of the intermediate term (5 years) beef production potential available to the Alberta beef industry are complicated by uncertainty concerning such key variables as economic growth in Canada, transportation rates, government programs, and other factors affecting regional supply and demand conditions. Most forecasts suggest slow, or

possibly zero real growth in per capita incomes for the intermediate term (1981-86). As a result, growth in the demand for beef could be restricted to the expected increase in population, plus some adjustment for moderate economic growth.

Two possible scenarios can be visualized to reflect the potential demand for beef. These scenarios are based on a continuation of the 1970's growth in population (1.3 percent per year) and projected increases in per capita consumption of 0 and 5 percent from an estimated 90 pounds in 1983 (Table II-1). Population is assumed to increase uniformly over the 1983 to 1988 period, whereas consumption increases by 5% in the moderate growth scenario reflecting a low rate of growth in consumer incomes during the economic recovery period to 1986. It should be recognized that the 1983 consumption level was based on a high level of female slaughter which will result in a further decline in the 1984 cow herd. As a result, the consumption in both the zero and moderate growth scenarios would necessitate increases in the breeding herd and reduced female slaughter over the 1985-1986 period.

TABLE II-1 PROJECTED DEMAND FOR CANADIAN BEEF
(Percent and Per Capita)

	ZERO GROWTH	MODERATE GROWTH
	1988	1988
Projected Increase		
- Population (%)	6.5	6.5
- Consumption (%)	-	5.0
- Total Increase (%)	6.5	11.8
Per Capita (lbs.)	90.0	94.5

B. FEEDLOT VIABILITY

Several factors were reviewed in Part I which related to the impact on Alberta price margins, feeding margins, and in turn gross margins relative to Ontario and the U.S.. These factors, as well as processor efficiency, will determine Alberta's production and market share of projected beef requirements.

1. PRICE RELATIONSHIPS AND PRICE MARGINS

Price margins for finishing cattle were at similar levels in the 1971-78 period in Alberta, Ontario and the U.S.. Since 1978 the situation has changed with price margins generally negative and Alberta margins below those experienced in Ontario or the U.S. (outlined in Figure B-2 previously). When Alberta feeder cattle are finished and sold in Ontario, the Toronto cattle price advantage over Alberta is high enough to offset the freight cost for feeder cattle. In other words the price margin on Alberta feeder cattle finished in Ontario is comparable to price margins experienced in Alberta.

Changes in regional price margins are based on the respective feeder and finished cattle prices in regions. Annual averages indicate that Calgary feeder cattle prices have generally averaged lower then Toronto or Kansas City (Calgary was higher in 1978-80). In the last quarter of the year, Alberta prices tend to be higher. The most notable factor affecting relative price margins is the regional difference in finished cattle prices which shows Alberta declining each year, and most notably since 1978. This

decline in relative finished cattle prices is a direct reflection of differences in regional wholesale prices, determined largely by transportation rates and the degree of arbitrage between markets for cattle and for beef.

The Alberta - East red meat freight rate, plus rebate, has continued to increase each year resulting in widening East-West wholesale and cattle price differentials. Compared to the U.S., Alberta has maintained a constant wholesale price relationship, while cattle prices have declined. On the other hand, Eastern Canadian wholesale prices increased relative to the U.S., while the Toronto price advantage over the U.S. for cattle showed a decline in 1982-83. Relatively free trade in slaughter cattle has ensured market arbitrage between the Ontario and U.S. cattle markets, while quota restrictions and product differences have limited market arbitrage between Canadian and U.S. quality beef markets.

In summary, Canadian wholesale prices are artifically high relative to the U.S. due to limited quality beef trade. This excess is in proportion to increases in the West-East freight rate, plus rebate. The deduction of these costs will continue to hold Alberta cattle prices below the U.S. much of the time, while Alberta - U.S. wholesale prices will maintain a constant relationship.

Continuation of rising red meat freight rates and a lack of market arbitrage between the Ontario - U.S. beef markets points toward growing opportunities to export Alberta slaughter cattle to the U.S., with no change in potential for shipping Alberta beef to the closer U.S. market.

2. FEED COSTS AND FEEDING MARGINS

Alberta non-Board barley prices have shown a close relationship to corn prices in Ontario and the U.S.; however, the amplitude of barley prices has been more significant. Prices of barley have tended to increase relative to corn in high price periods and decline relative to corn in low price periods. Changes in relative barley-corn prices have not been in proportion to their respective feeding values, with the barley price averaging 79% of the Ontario corn price and 83.6% of the U.S. corn price over the 1971-83 period. Cash price differences tend to overstate the Alberta feed cost advantage when corn prices are converted to a barley equivalent basis during periods of high grain prices, and understate the advantage during periods of low grain prices.

While silage utilization has increased in Alberta, definitive information regarding the yield per acre of silage v.s. barley has not been documented (a 12 Bushel to 1 Ton ratio was one suggested benchmark). Clearly silage yields vary significantly relative to grain yields depending on annual growing conditions. At the same time, in some farm operations silage production provides an advantage in land management and harvesting decisions. It appears that under controlled conditions on irrigation silage yields relative to grain are generally more favorable than on dryland.

Based on relative feed costs and cattle prices Alberta feeding margins have followed patterns similar to those in Ontario and the U.S. (outlined

in Figure B-7 previously). While regional differences in both feed and cattle prices contribute to relative feeding margins, it appears that Alberta feeding margins were lower than those in Ontario in 1975, 1976 and slightly lower in 1980 through early 1983. The 1975-76 period coincided with a time when the barley-equivalent price of corn was lower than barley. The 1980-83 period has coincided with barley-equivalent prices of corn ranging from close to barley values to $1.00/cwt. lower. The other factor which has contributed to the Ontario feeding margin advance is the decline in prices of Alberta slaughter cattle relative to Ontario.

Looking toward the future, relative grain and cattle prices can be expected to reduce Alberta's competitive position in feeding margins. With the current freight rate legislation for grains and the objective for more export capacity, Alberta off-quota barley prices should change relative to Ontario and U.S. corn. During periods of strong export demand, formula freight rates should result in higher off-quota barley prices relative to corn. The situation during periods of surplus feedgrains should reflect those of the past where off-quota barley prices have been at a discount relative to corn. At the same time, the red meat freight rate can be expected to increase which implies that the Toronto - Alberta price differential for cattle will continue to widen, further reducing Alberta feeding margins relative to Ontario and the U.S.

3. FEEDLOT GROSS MARGINS

Based on the decline in Alberta price margins and feeding margins relative to Ontario and to a lesser extent the U.S., Alberta gross margins

have declined (Figure B-8). This has occurred since 1979 largely reflecting transportation rates for grain and beef as described in the previous two sections.

C. PROCESSOR VIABILITY

The future viability of Alberta beef processing plants will depend on a number of factors affecting plant volumes, costs, gross margins and by-product values. Historically, Alberta processing capacity increased from about 27,000 head per week in the mid-1960's to about 37,000 head per week by 1974. Present capacity is rated between 32,000 and 33,000 head per week. Average plant utilization rates (slaughter-capacity ratios) in the province generally increased from about 60 percent (1970) to 85 percent (1977) as growth in slaughter volumes exceeded the rate of increase in plant capacity. Since 1978, slaughter-capacity ratios have fluctuated between 75 and 84 percent of capacity as both total industry capacity and slaughter volumes have declined. Future plant utilization rates will depend on trends in industry capacity and slaughter volumes.

Inspected slaughter volumes in Alberta have closely reflected the steer population and decisions concerning the size of the cow herd. Feeder cattle imports have been largely offset by out-of-province shipments. As a result, future slaughter volumes can be expected to vary with changes in the size of the Alberta cow-herd. During 1983 the number of beef cows on farms (1.35 million) was about equal to the 1972 level, and in 1984 the herd is expected to decline by about 2 to 3 percent. Based on historic female slaughter to herd size ratios, stabilizing the herd at the 1983

level would require heifer slaughter to decline below 30 percent of the cow herd and cow slaughter to decline to less than 12 percent. As a result total cattle slaughter would be reduced by at least 8 percent (100,000 head) from the 1983 level. The projected increase in slaughter volumes necessary to accommodate a 5 percent increase in per capita consumption and 6.5 percent increase in population by 1988-89 would require a reduction in 1984 and 1985 volumes of about 14 to 15 percent to approximately 1.1 million head per year, and a decrease of 7-8 percent from 1983 levels thereafter until the additional production reached the market. That is, increased slaughter volume requires herd stabilization, plus an initial increased heifer retention (spread over 2 years) to provide for an increase in production.

Reduced slaughter volumes which would achieve an estimated 12 percent increase in total beef supply by 1988-89 translates into a similar reduction in processing plant utilization rates, which can be expected to generate lower packer margins. Gross margins appear to vary directly with changes in slaughter-capacity ratios. This suggests that packers "bid-up" the price of slaughter cattle relative to wholesale beef prices during periods of reduced slaughter cattle supply in an attempt to maintain higher rates of plant utilization. Over the 1977-79 period estimated Alberta packer margins declined from -$10.17 to -$59.92 per head (excluding by-product values) as the average slaughter-capacity ratio declined from about 85 to 75 percent.

Packer attempts to increase margins are largely constrained by regional slaughter cattle and wholesale price relationships. Any reduction

in Alberta slaughter cattle prices relative to those of the United States would result in larger numbers of animals exported. That is, Alberta packers must compete with the export market for the available slaughter cattle supply in the province.

Regional packer gross margins have followed almost identical patterns of adjustment over the past decade. Estimated Alberta margins appear to exceed those of both Eastern Canadian and Midwest U.S. packers; however, when lower by-product values (due to freight costs) are taken into account, Alberta margins are likely very similar to those of Ontario. A continuation of the trend in freight rates on by-products could eventually result in lower Western Canadian margins. Excluding by-product values, packer margins on 1140 pound A1/Choice steers averaged -$18.58 in Alberta over the 1976-83 period while Ontario and U.S. packers averaged -$22.46 and -$37.20 (Cdn.) respectively. Lower margins in the U.S. appear to reflect both lower processing costs (primarily labor and power) and high processing efficiency. Processors in the U.S. have been successful in acquiring regressive wage settlements; but this advantage will probably disappear as the U.S. economy returns closer to a full employment situation. An increase in wage rates would necessitate an increase in packer gross margins to accommodate the higher processing cost. Major packers in the United States (primarily IBP and Missouri Beef) also appear to have attained a degree of flexibility in plant operating hours in order to achieve optimum rates of plant utilization. In certain cases this has involved the transfer of available volume among plants on either a temporary or permanent basis.

Beef packing plant costs per animal slaughtered are sensitive to the rate and hours of plant operation, labor rates, overhead costs and, to a lesser extent, other input requirements. Labor costs are the single most important item representing almost half of the total plant costs. Under most Alberta labor agreements, labor is essentially a fixed cost for a guaranteed 32.0 to 39.5 hour week. As a result, processing efficiency in Alberta is more sensitive to changes in the rate of plant utilization (ie. industry slaughter-capacity ratio) than it is for plants or regions having more flexible labor requirements. During 1983 Alberta beef processing plants averaged 82 percent of capacity utilization resulting in about $5.46 per head increase in processing costs as compared to operating at capacity. Almost half of this increase was due to fixed labor requirements.

The future cost of processing cattle in Alberta will depend on the availability of slaughter cattle; industry processing capacity; and trends in input costs, particularly labor rates and requirements. Based on an assumed industry growth of 12 percent by 1988-89, 1983 processing capacity, and 1983 costs as shown in Figure D-8, processing costs can be expected to increase from about $37.67 (1983) to about $42.94 per head as the average slaughter-capacity ratios decline during the initial 2 years of the expansionary phase (ie. 14 to 15 percent decrease in slaughter volume from the 1983 level). Average processing costs would then decrease to about $40.01 in the third year (8 percent decrease in slaughter from 1983) before returning to about $37.67 in the fourth year as slaughter levels approach the 1983 level, with the cow herd stabilized at a higher level. The 12 percent increase in slaughter during the fifth year would increase the slaughter-capacity ratio to about 94 percent and reduce average processing

costs to about $33.92 per head.

In terms of regional advantages, the assumed expansionary phase in the North American beef industry can be expected to have a similar impact on beef processing costs in Alberta and Ontario since the industry structures are similar. In the case of the U.S. industry, the assumed growth pattern would not necessarily result in higher processing costs during the initial years of the expansionary phase. Concentration in the U.S. industry has led to greater flexibility in labor utilization and costs, as well as the ability to adjust industry capacity to more closely reflect volume requirements. That is, the two major U.S. firms (IBP and Missouri Beef) which account for about 2/3 of U.S. beef slaughter, are able to shift volume among plants to maintain high rates of plant utilization.

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APPENDIX 1

BRAND INSPECTION RECORD OF LIVE CATTLE AND CALF SHIPMENTS FROM ALBERTA

TO:	1971	1972	1973	1974	1975	1976	1977
B.C.	11465	5453	7928	14202	21109	27864	34885
SASK.	4234	9307	12805	16872	18094	18693	17463
MAN.	3162	3211	11554	10231	8715	8432	10425
ONT.	79957	91722	88708	158081	195923	192340	189645
QUE.	1340	2136	10276	23307	25711	11361	11253
MAR.	21	-	14	272	323	707	166
U.S.	4805	18057	32906	7820	31958	59222	70076
OTHER	-	-	917	64	1	317	509
TOTAL	104984	129886	165108	230849	301834	318936	334412

To:	1978	1979	1980	1981	1 1982
B.C.	28324	21325	21570	18317	16523
SASK.	30337	46703	42076	44227	38595
MAN.	8919	3007	7185	8832	3842
ONT.	197170	180207	194119	149025	187614
QUE.	363	2829	4484	5926	7872
MAR.	89	82	494	90	5
U.S.	68910	29342	36262	37460	71553
OTHER	2235	560	409	9152	5699
TOTAL	336347	284055	306599	273087	331683

SOURCE: Alberta Agriculture, Agriculture Statistics Yearbook.

APPENDIX 2

ALBERTA CATTLE SHIPMENTS TO EASTERN CANADA

	Slaughter Cattle	Feeders	For Sale at Stockyards *	Total
1978	7242	184123	27418	218783
1979	3148	167635	23197	193980
1980	10871	192017	21052	223940
1981	14220	141487	10024	165731
1982	17619	155555	32587	205761

* Predominately feeder cattle.

Source: Agriculture Canada, Livestock Meat Trade Report.

APPENDIX 3

TABLE 1

	OMAHA CORN	CALGARY BARLEY	ONTARIO CORN	CBLY-UCOR	CBLY-OCOR	OCOR-UCOR
JAN-1971	1.22681	.7666667	1.548712	-.460143	-.782046	.3219024
APR	1.279283	.8333333	1.449660	-.44595	-.636327	.1903778
JUL	1.347353	.8	1.414862	-.547353	-.614862	.0675088
OCT	1.179387	.7	1.164382	-.479387	-.464382	-.014925
JAN-1972	1.240397	.7333333	1.177917	-.507063	-.444584	-.062479
APR	1.23465	.7333333	1.206492	-.501317	-.473159	-.028158
JUL	1.222207	.75	1.347251	-.472207	-.597251	.1250445
OCT	1.355023	.9	1.459642	-.455023	-.559642	.1046192
JAN-1973	1.508263	1.066667	1.756135	-.581597	-.749468	.2478718
APR	1.865167	1.03	2.104620	-.835167	-1.07462	.2394532
JUL	2.475827	1.383333	2.734876	-1.09249	-1.35154	.2590490
OCT	2.40837	2.183333	2.575339	-.305437	-.472005	.1665688
JAN-1974	2.75816	2.373333	3.114673	-.376827	-.741340	.3645128
APR	2.470443	2.333333	2.927229	-.13711	-.593896	.4567856
JUL	3.333483	2.496667	3.688054	-.836817	-1.19139	.3545704
OCT	3.43433	2.67	3.689948	-.76433	-1.01995	.2556184
JAN-1975	2.864883	2.486667	3.104314	-.458217	-.697647	.2394304
APR	2.894623	2.276667	2.899168	-.617957	-.622502	.0045458
JUL	3.087833	2.266667	3.085198	-.821166	-.818531	-.002635
OCT	2.666763	2.166667	2.631693	-.500097	-.465026	-.035070
JAN-1976	2.583513	2.143333	2.573809	-.44018	-.430475	-.009705
APR	2.671317	2.183333	2.553891	-.567983	-.450557	-.117426
JUL	2.641887	1.916667	2.574811	-.72522	-.658144	-.067076
OCT	2.259867	1.733333	2.117326	-.526533	-.383993	-.142541
JAN-1977	2.44089	1.823333	2.335145	-.617557	-.511812	-.105745
APR	2.31419	1.896667	2.421411	-.417523	-.524745	.1072213
JUL	1.864183	1.676667	2.015319	-.187437	-.338652	.1512158
OCT	2.148423	1.52	2.029099	-.628423	-.509099	-.119325
JAN-1978	2.297683	1.553333	2.223774	-.74435	-.670441	-.073909
APR	2.598433	1.556667	2.751611	-1.04177	-1.19494	.1531774
JUL	2.38834	1.36	2.616466	-.94834	-1.25647	.3081264
OCT	2.42671	1.333333	2.671437	-1.09338	-1.33810	.2447267
JAN-1979	2.53787	1.38	2.808614	-1.15787	-1.42061	.2627443
APR	2.799947	1.54	3.196787	-1.25995	-1.65671	.3967599
JUL	2.914797	1.746667	3.647729	-1.16813	-1.98186	.7329326
OCT	2.759623	2.086667	3.151876	-.672957	-1.06441	.3914522
JAN-1980	2.644287	2.373333	3.018185	-.270953	-.644852	.3738983
APR	2.820947	2.346667	3.219117	-.47428	-.872450	.3981702
JUL	3.447877	2.686667	3.957343	-.72841	-1.27068	.5422668
OCT	3.870673	2.813333	3.959635	-1.05734	-1.14630	.0889618
JAN-1981	3.83348	2.986667	4.207109	-.926813	-1.30044	.3736285
APR	3.8572	2.966667	4.214458	-.898533	-1.24798	.3574499
JUL	3.48231	2.696667	3.959978	-.705643	-1.26338	.5577682
OCT	2.859943	2.26	3.947617	-.599943	-.787617	.1881732
JAN-1982	2.977267	2.316667	2.886778	-.6606	-.564111	-.096489
APR	3.282873	2.376667	3.140542	-.905807	-.771875	-.133932
JUL	2.916297	2.123333	3.282383	-.792943	-1.07905	.2860862
OCT	2.88672	1.893333	2.61	-.913387	-.716667	-.19672
JAN-1983	3.17428	1.956667	3.04	-1.21761	-1.08333	-.13428

APPENDIX 3

TABLE 2

	OMAHA CORN	ONTARIO CORN	CALGARY BARLEY	SOYBEAN MEAL DECATOR
JAN-1971	2.190732	2.765558	1.597222	3.945292
APR	2.284435	2.624393	1.736111	3.950163
JUL	2.405988	2.526539	1.666667	3.999921
OCT	2.105905	2.079253	1.458333	3.917637
JAN-1972	2.214994	2.103424	1.527778	4.317297
APR	2.204732	2.154450	1.527778	4.68807
JUL	2.182512	2.405806	1.5625	5.081298
OCT	2.419685	2.606504	1.875000	6.701907
JAN-1973	2.693327	3.135956	2.097222	10.08289
APR	3.330655	3.758250	2.145833	15.49625
JUL	4.421119	4.883707	2.881944	13.44488
OCT	4.300661	4.598819	4.381944	8.644017
JAN-1974	4.911000	5.561916	4.944444	7.8276
APR	4.411506	5.227194	4.861111	5.243283
JUL	5.952649	6.585810	5.201389	7.058
OCT	6.132732	6.589194	5.562500	7.426583
JAN-1975	5.115863	5.543417	5.013889	6.055917
APR	5.168970	5.177086	4.743056	6.146533
JUL	5.513988	5.589282	4.722222	6.731567
OCT	4.762077	4.699452	4.513889	6.293
JAN-1976	4.613417	4.596087	4.465278	6.45875
APR	4.770208	4.560519	4.381944	7.612083
JUL	4.717655	4.597876	3.993056	8.891633
OCT	4.035476	3.780939	3.611111	9.093967
JAN-1977	4.358732	4.169903	3.798611	11.86185
APR	4.132482	4.323949	3.951389	13.30475
JUL	3.328756	3.598784	3.493056	7.948233
OCT	3.836470	3.623390	3.166667	8.392383
JAN-1978	4.183006	3.971025	3.236111	9.170083
APR	4.640860	4.913591	3.243056	9.76415
JUL	4.122036	4.672261	2.833333	9.5862
OCT	4.333411	4.770423	2.777778	10.6611
JAN-1979	4.531911	5.001097	2.875000	11.2661
APR	4.999985	5.708185	3.208333	11.37223
JUL	5.284994	6.513802	3.638889	11.27668
OCT	4.927899	5.626921	4.347222	10.8834
JAN-1980	4.721940	5.389616	4.944444	10.86895
APR	5.037405	5.748423	4.888889	9.378817
JUL	6.089865	7.066683	5.597222	12.17848
OCT	6.911917	7.870777	5.861111	14.42868
JAN-1981	6.8455	7.512694	6.055556	12.84453
APR	6.087857	7.526161	6.180556	12.843
JUL	6.075354	7.071375	5.618056	11.99717
OCT	5.186149	5.442172	4.798333	10.8483
JAN-1982	5.316548	5.144247	4.826389	11.38987
APR	5.868845	5.622396	4.951389	11.7374
JUL	5.287673	5.718541	4.923611	10.66398
OCT	5.012000	4.668714	3.944444	10.44358
JAN-1983	5.668357	5.428571	4.076389	10.75413

APPENDIX 4

TABLE 1
DAILY REQUIREMENTS FOR FINISHING YEARLING CATTLE
(90% Dry Matter Basis)

Body Weight (lbs)	Average Gain (lbs)	Total Feed (lbs)	Total Protein (lbs)	Digestible Protein (lbs)	Digestible Energy (M.Cal)
600	2.6	17.5	1.8	1.3	22.8
800	2.7	22.3	2.2	1.7	29.0
1000	2.6	25.8	2.6	1.9	33.6
1100	2.3	25.8	2.6	1.9	33.5

Source: National Academy of Sciences (NRC), Nutrient Requirements of Domestic Animals, Publication 1137 (Revised) Wash.D.C.1963

TABLE 2
NUTRIENT CONTENT OF FEEDS FOR FINISHING YEARLING CATTLE
(90% Dry Matter Basis)

	Total Protein (%)	Digestible Protein (*) (%)	Digestible Energy (M.Cal/lb)
Grains - Barley	11.07	7.29	1.485
- Oats	10.44	6.75	1.368
- Wheat	14.22	10.08	1.575
- Corn (NRC)	9.0	5.49	1.620
Silages- Barley	9.81 (3.49)	6.21 (2.21)	1.08 (.384)
- Oats	9.0 (3.20)	5.49 (1.95)	1.08 (.384)
- Corn	7.92 (2.82)	4.59 (1.63)	1.17 (.416)

- Numbers in brackets indicate as fed basis (32% dry matter) for silages.

(*) Calculated as .877 times Total Protein minus 2.64 dry basis.

Source: Alberta Agriculture, Animal Industry Division, and NRC nutrient content of Number 2 Yellow Corn.

APPENDIX 4 con't

TABLE 3

NUTRIENT CONTENT OF DAILY FEED
(Finishing Yearling Cattle) *

	PROTEIN (lbs. / day)			ENERGY (M.Cal per day)		
Live Weight (lbs)	600	800	1000	600	800	1000
Daily Feed (lbs)	17.5	22.3	25.8	17.5	22.3	25.8
Requirement (NRC)	1.3	1.7	1.9	22.8	29.0	33.6
Grains - Barley	1.3	1.6	1.9	26.0	33.1	38.3
- Oats	1.2	1.5	1.7	23.9	30.5	35.3
- Corn	1.0	1.2	1.4	28.4	36.1	41.8
Silages - Barley	1.1	1.4	1.6	18.9	24.1	27.9
- Oats	1.0	1.2	1.4	18.9	24.1	27.9
- Corn	0.8	1.0	1.4	20.5	26.1	30.2

* 90% dry matter basis and 2.6 to 2.7 lbs. average daily gain (Table 1 and 2 above).

APPENDIX 5

BARLEY STOCKS
('000 Tonnes)

	ALL POSITIONS CANADA (August 1)	ALL POSITIONS CANADA (March 31)	ON-FARMS PRAIRIES (August 1)	ON-FARMS PRAIRIES (March 31)
70/71	4465	N/A	2613	N/A
71/72	3141	N/A	1198	N/A
72/73	3829	8601	1699	5922
73/74	4203	8005	1818	5770
74/75	4538	7936	1321	5008
75/76	4104	6830	1002	4354
76/77	2764	6520	1006	4572
77/78	3218	9083	1075	7076
78/79	5208	9147	3026	7294
79/80	4895	5777	3092	4246
80/81	2005	6987	980	5117
81/82	3203	8704	991	6860
82/83	4163	10157	1790	8170
83/84	5154		3175	

Source: August 1 data - Canada Grains Council, Statistical Handbook
March 31 data - Statistics Canada - Winnipeg Office.

APPENDIX 6

WEST TO EAST CATTLE MOVEMENT (1971 - 82) *

	CATTLE			CALVES					
	Sltr.	Feeder	Stkyd.	Sltr.	Feeder	Stkyd.	Total Sltr.	Total Feeder	Total Stkyd
Total West									
1971	80904	34682	16533	7449	263404	28703	88353	298086	45236
1972	80979	51483	29446	8733	279641	38431	89712	331124	67877
1973	63533	39366	24334	7466	262983	32254	70999	302349	56588
1974	133335	72470	37113	15565	214796	38469	148900	287266	75582
1975	127383	115574	60715	31494	242883	47696	158877	358457	108411
1976	45256	108652	34925	19773	169249	37601	65029	277901	72526
1977	38622	73302	22598	10231	135153	23604	48853	208455	46202
1978									
Alberta	7032	43222	8941	210	140901	18477	7242	184123	27418
Total West	23031	149798	36475	7586	405834	54974	30617	555632	91449
1979									
Alberta	2594	42541	5111	554	125094	18086	3148	167635	23197
Total West	10627	142490	34731	2973	299786	41890	13600	442276	76621
1980									
Alberta	10528	32184	7535	343	159833	13517	10871	192017	21052
Total West	32499	122897	42656	4342	466321	46336	36841	589218	88992
1981									
Alberta	13199	45105	5121	1021	96385	4903	14220	141490	10024
Total West	30301	142746	32269	3035	316472	30130	33336	459218	62399
1982									
Alberta	17353	48195	7581	266	107360	25006	17619	155555	32587
Total West	36027	176777	39490	2745	325260	67191	38772	502037	106681

* 1971 - 1977 is rail movement only, 1978 - 1982 includes truck movement.

Source: Agriculture Canada, Annual Livestock Market Reviews.

APPENDIX 7

CATTLE CAR LOADING LEVELS
(Head Per Deck)

Ave. Weight lbs.	400 to 449	500 to 549	600 to 649	700 to 749	800 to 849	900 to 949	1000 to 1049	1100 to 1149	1200 to 1249
Car Width									
8'6"	56	46	41	37	34	31	29	27	25
9'0"	60	50	44	40	36	33	31	29	27

Source: OAC Breeder and Feeder, Nov. 1981.

APPENDIX B

TRUCK FREIGHT RATES ON SUSPENDED AND BOXED BEEF
CALGARY TO TORONTO

(MINIMUM WEIGHT - #/CWT)

	SUSPENDED BEEF			BOXED OR PACKAGED BEEF			
	33000	36000	40000	33000	36000	FRESH 40000	FROZEN 40000
JAN. 1/70	346	340	311	-	290	250	250
FEB.14/70	361	355	326	-	-	-	-
FEB.13/71	373	355	338	-	305	263	263
OCT. 4/71	391	370	355	-	322	284	279
MAY 1/72	411	381	366	-	338	289	279
MAR. 5/73	411	381	366	-	352	301	291
AUG. 1/74	436	404	388	-	373	319	308
JAN.20/75	491	466	422	-	429	367	354
APR.15/75	535	527	476	469	433	385	372
AUG. 9/76	611	569	514	504	465	414	400
SEPT 6/77	660	615	555	544	502	447	432
MAY 15/78	700	652	588	577	532	474	458
MAR.19/79	700	652	588	-	-	-	-
JUN 11/79	742	691	623	612	564	502	485
MAR.17/80	809	753	679	667	615	547	529
JAN.19/81	837	795	718	714	658	585	566
MAY 1/81	896	851	768	764	704	626	606
APR.26/82	943	895	808	804	741	659	638
OCT.12/82	1000	949	856	852	785	659	638

SOURCE: CTTB 1015, ITEMS 6610 & 6630.

APPENDIX 9

MEAT AND POULTRY CONSUMPTION PER CAPITA

	BEEF	VEAL	LAMB	PORK	MEAT	CHICKEN	TURKEY	POULTRY	TOTAL
1971	88.5	4.4	3.2	65.3	165.8	29.1	10.2	42.9	208.7
1972	94.6	3.7	4.6	63.1	170.2	30.7	10.3	43.8	214
1973	92.7	3.4	3.6	59.3	162.9	32.2	10.1	45.4	208.3
1974	96.1	3.5	2.5	62	167.9	30.7	10.4	44.2	212.1
1975	106.4	5.2	2.8	53.2	171.4	29.2	9.4	41.4	212.8
1976	113.2	4.9	2.3	55.3	179.5	32.2	9.2	44.1	223.6
1977	107.9	4.8	1.8	55.5	173.6	33.7	9.2	45.6	219.2
1978	100.9	3.9	1.9	57.7	167	35.3	9.2	47.2	214.2
1979	88.2	3.1	2.3	65.5	160.9	39	9	50.5	211.4
1980	87.6	3.1	1.7	71.2	167.9	37.9	9.4	50	217.9
1981	90.3	3.5	1.6	66.8	165.2	37.5	9.2	49.6	214.8
1982	89.1	3.7	1.6	61.5	158.8	37.7	9.2	50	208.8

SOURCE: STATISTICS CANADA CAT.NO.'S 23-202 AND 23-203, PRODUCTION OF POULTRY AND EGGS, AND LIVESTOCK AND ANIMAL PRODUCTS STATISTICS.

SHARES OF TOTAL MEAT AND POULTRY CONSUMPTION

	BEEF	VEAL	LAMB	PORK	MEAT	CHICKEN	TURKEY	POULTRY
1971	.4240537	.0210829	.0153330	.3128893	.7944418	.1394346	.0488748	.2055582
1972	.4420561	.0172897	.0214953	.2948598	.7953271	.1434579	.0481388	.2046729
1973	.4450312	.0163226	.0172828	.2846855	.7820451	.1545847	.0484878	.2179549
1974	.4530882	.0165017	.0117869	.2923149	.7916077	.1447430	.0490335	.2083923
1975	.5	.0244361	.0131579	.25	.8054511	.1372180	.0441729	.1945489
1976	.5062612	.0219141	.0102862	.2473166	.8027728	.1440072	.0411449	.1972272
1977	.4922445	.0218978	.0082117	.2531934	.7919708	.1537489	.0419788	.2080292
1978	.4710551	.0182073	.0088702	.2693744	.7796452	.1647993	.0429585	.2203548
1979	.4172185	.0146641	.0108798	.3098392	.7611164	.1844944	.0425733	.2388836
1980	.4020193	.0142267	.0078017	.3267554	.7705369	.1739338	.0431391	.2294631
1981	.4203911	.0162942	.0074488	.3109870	.7690875	.1745810	.0428385	.2309125
1982	.4267241	.0177203	.0076628	.2945402	.7605364	.1805556	.0448613	.2394636

PRICE INDEXES FOR MEATS AND POULTRY

	BEEF	PORK	CHICKEN	TURKEY	ALL ITEMS	DISPOSABLE INCOME (PER CAPITA)
1971	100	100	100	100	100	2758
1972	109.2	120.8	115.1	110	104.8	3059
1973	131.9	153.6	151	146.6	112.7	3603
1974	145.5	156	170.9	167.4	125	4147
1975	138	199.8	188.7	172.8	138.5	4764
1976	129.1	208.2	188.7	195.1	148.9	5476
1977	137.4	203.8	190	194.1	160.8	5972
1978	200.7	235.3	220.6	215.7	175.2	6671
1979	264	239	243	263.1	191.2	7459
1980	286.7	237.1	261.5	253.8	210.6	8368
1981	294	272.8	311.2	274.9	236.9	9648
1982	292.1	317.5	319.4	303	262.5	10377

SOURCE: STATISTICS CANADA CAT. NO 62-010 CONSUMER PRICES AND PRICE INDEXES.

APPENDIX 10

ALBERTA VOLUME-CAPACITY RATIOS
— % —

	Annual Average	Monthly Low	Monthly High
1970	59	48	70
71	61	49	72
72	66	59	74
73	67	58	75
74	59	41 1)	73
75	70	62	79
76	80	71	88
77	86	79	96
78	80	59	92
79	76	65	84
80	80	71	87
81	83	76	87
82	84	69	89
83 2)	82	73	94

1) Strike in 1974 resulted in low vol/cap. ratio.
2) January - September.